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THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY, STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS

VAN THAER, *Principles of Agriculture*

LONDON PRINTED BY WILLIAM CLOWES AND SONS, STAMFORD STREET,
AND CHARING CROSS.

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In Reprints of the Journal all Appendix matter and, in one instance, an Article in the body of the Journal (which at the time had become obsolete), were omitted; the Roman numeral folios, however (for convenience of reference), were reprinted without alteration in the Appendix matter retained

METEOROLOGY; IMPORTATIONS OF GRAIN; SALES OF BRITISH WHEAT; PRICES OF CORN AND OTHER PRODUCE; AGRICULTURAL STATISTICS; AND STATISTICS OF DAIRY PRODUCE.

[*The facts are derived chiefly from the Meteorological Reports of* Mr. GLAISHER, *and the Returns of the* BOARD OF TRADE, *and of the* INSPECTOR-GENERAL OF IMPORTS AND EXPORTS.]

METEOROLOGY.—1876.

First Quarter (January, February, March).—The first four days of the year were warm, the temperature showing a mean daily excess of nearly 6°. From 5th to 16th January a cold period prevailed, and the mean temperature averaged a defect of nearly 7°; a warm period then set in, and continued until 3rd February, followed by nine days cold weather. From 14th February to 8th March the temperature was generally in excess, but on 9th, a third cold period commenced, and lasted until 27th. The last four days of March were warm. Mr. Glaisher calls attention to the remarkable alternations of temperature in each month of the quarter. The mean temperature was below the average on 43, and showed an excess on 48 of the 91 days in the quarter. As evidence of the extremes of temperature which prevailed, it may be mentioned that the average deficiency on the 43 days of low temperature was 5°·4, and the average excess on the 48 warm days was 5°·7.

The mean temperature of the quarter was 39°·8, and 1°·0 above the average for the corresponding period in 105 years. In January the mean was 37°·1, and both in February and March 41°·1; the mean showed an excess of 2°·5 in February, whereas it differed but slightly from the average in January and March. The mean temperature of the quarter at 50 stations of observation ranged from 34°·4 at Allenheads (Northumberland), to 44°·9 at Helston (Cornwall).

The *amount of rain* and melted snow measured during the quarter at Greenwich did not, however, exceed 4·9 inches, which corresponded with the average amount in 61 years; the amounts in inches were 1·1 in January, 1·5 in February, and 2·3 in March. The average rainfall at all the 50 stations of observation between latitudes 50° and

55° was 8·2 inches, against 6·3 and 6·6 inches in the corresponding periods of 1874 and 1875. Between latitudes 54° and 55° the average rainfall was 9·5 inches, whereas between 51° and 52° it did not exceed 7·0 inches. The rainfall in the 13 weeks ending 1st April in those of the twenty large English towns for which returns are furnished, ranged from 4·7 inches in Sunderland to 11·6 inches in Bristol.

Leaf-buds first appeared on the Sycamore, on the 27th of February at Strathfield Turgiss.

Leaf-buds first appeared on the Horse-chestnut, on the 26th of February at Helston; on the 7th of March at Strathfield Turgiss; on the 12th at Caterham; on the 20th at Guernsey; and on the 27th at Weybridge.

Leaf-buds first appeared on the Hawthorn, on the 15th of February at Weybridge.

Field Elm in leaf, on the 8th of March at Helston.

Hawthorn in leaf, on the 9th of March at Oxford; on the 10th at Helston; on the 20th at Guernsey; and on the 24th at Weybridge.

Pear in blossom, on the 22nd of February at Helston; and on the 21st of March at Llandudno.

Peach in blossom, on the 23rd of February at Helston; on the 14th of March at Oxford; and on 26th at Wisbech.

Plum in blossom, on the 17th of March at Strathfield Turgiss; on the 24th at Llandudno; and on the 28th at Oxford.

Wryneck arrived, on the 31st of March at Guernsey.

Woodcock departed, on the 25th of February from Strathfield Turgiss.

Second Quarter (*April*, *May*, *June*).—The warm weather which set in on 28th March continued until 9th April, the mean temperature of the first nine days of the quarter being in excess by 5½°. A severely cold period commenced on 10th April and lasted until 19th. During this period snow fell generally throughout the country, and the heaviest snow-storm of the whole winter occurred on 14th. The average daily deficiency of temperature from 10th to 19th April was 4¼°. From 20th to 29th April the weather was moderately warm, but a long cold period set in on 30th, which continued, with few exceptions, till 18th June. The weather was cold during the greater part of May; the direction of the wind was principally E. and N.E., snow fell occasionally up to 14th, and no rain fell between the end of April and 21st May. The average daily deficiency of temperature during the 50 days ending 18th June was nearly 3¼°. From 19th to the end of June the temperature was, for the most part, warm, and showed an average daily excess of 2¼.°

The *mean temperature* of the quarter was 51°·7 and 1°·3 below the average for the corresponding period in 105 years. In April the mean was 47°·2 and 1°·1 below the average; in May the mean was 49°·4, and the deficiency 3°·1; and in June 58°·5, or in excess by 0°·3. The mean temperature of the quarter at 42 stations of observation ranged from 47°·9 at Calcethorpe (Lincolnshire), to 53°·3 at Barnstaple.

The *amount of rain* measured during the quarter at Greenwich was only 3·5 inches, and was 2·3 inches below the average amount for the corresponding period in 61 years. The amounts measured in the three months were respectively 1·3 inch in April, and 1·1 inch both in May and June; these monthly amounts showed a deficiency of nearly half an inch in April, and of about an inch in May and in June. The average rainfall at the various stations of observation between latitudes 50° and 55° was 5·6 inches, against 4·4 and 5·9 inches in the corresponding periods of 1874 and 1875. The average rainfall was 4·4 inches between latitudes 50° and 51°, whereas between 54° and 55° it averaged 7·1. The measured rainfall during the 13 weeks ending 1st July in those of the twenty large English towns furnishing returns, ranged from 3·5 in London and 4·6 both in Bristol and Liverpool, to 7·3 inches in Wolverhampton and Manchester.

	The earliest			The latest.		
Field elm in leaf,	April 5th,	at	Strathfield;	May 12th	at	Milltown.
Wych elm „	„ 16th	„	Guernsey;	April 24th	„	Oxford.
Oak „	„ 9th	„	Oxford;	„ 25th	„	Milltown.
Lime „	„ 8th	„	Strathfield;	May 24th	„	Milltown.
Sycamore „	„ 5th	„	Strathfield;	„ 7th	„	Milltown.
Hawthorn „	„ 8th	„	Calcethorpe;	April 23rd	„	Llandudno.
Hazel „	„ 5th	„	Oxford;	May 20th	„	Milltown.
Lilac in blossom,	„ 1st	„	Helston;	„ 29th	„	Calcethorpe.
Honeysuckle „	May 16th	„	Llandudno;	June 20th	„	Hull.
Mountain ash „	„ 13th	„	Strathfield;	May 24th	„	Llandudno.
Laburnum „	April 26th	„	Helston;	„ 31st	„	Calcethorpe.
Yellow broom „	„ 9th	„	Weybridge;	„ 28th	„	Caterham.
Apple „	„ 20th	„	Llandudno;	„ 15th	„	Milltown.
Pear „	„ 1st	„	Strathfield;	April 28th	„	Hull.
Plum „	„ 10th	„	Milltown;	May 8th	„	Silloth.
Cherry „	„ 6th	„	Strathfield;	„ 9th	„	Allenheads.
Wheat in ear,	June 15th	„	Helston;	June 23rd	„	Llandudno.
Wheat in flower,	„ 22nd	„	Weybridge;	„ 30th	„	Calcethorpe.
Barley in ear,	„ 23rd	„	Llandudno;	„ 27th	„	Calcethorpe.
Oats „	„ 20th	„	Weybridge;	„ 30th	„	Strathfield.
Cuckoo arrived,	April 1st	„	Helston;	May 6th	„	Bywell.
Swallow „	„ 8th	„	Helston;	„ 20th	„	Allenheads.
Nightingale „	„ 19th	„	Cardington;	„ 23rd	„	Streatley.

Third Quarter (*July*, *August*, *September*).—Throughout July, and until the 22nd of August, the weather was generally fine and hot; the temperature was particularly high during the four days ending

17th July, and the five days ending 17th August. The average daily excess of temperature during the 53 days ending 22nd August was 4¼°. From the 23rd August until the 17th September low temperature generally prevailed, the average daily deficiency being equal to 3½°. A warm period, however, set in on the 18th September, and lasted until the end of the month.

The *mean temperature* of the quarter was 61°·8, and exceeded the average for the corresponding period in 105 years by 2°·1. In July the mean was 65°·9, and 4°·3 above the average. Since 1841 the mean temperature of July has only twice been as high as it was last quarter; it was 68°·1 in 1859 and 67°·5 in 1868. The mean in August was 63°·7, showing an excess of 2°·9, whereas in September it fell to 55°·8, and was 0°·8 below the average. The mean temperature of the quarter at 47 stations of observation ranged from 55°·7 at North Shields, to 63°·3 at East Tilbury.

The *rainfall* during the quarter at the Greenwich Observatory was but 5·3 inches, and was 2·2 inches below the average in the corresponding three months in 61 years. In July only 0·7 of an inch of rain was measured, showing a deficiency of nearly 2 inches; in August and September 2·0 inches and 2·6 inches were respectively measured, neither amount differing considerably from the average. The rainfall at all the stations of observation between latitudes 50° and 55° averaged 8·5 inches, against 10·3 inches in the corresponding quarter of last year; between 51° and 52° the average fall was 7·3 inches, whereas between 53° and 54° it was 9·5 inches. The measured rainfall during the 13 weeks ending 30th September in each of nineteen other large English towns furnishing returns exceeded that recorded at the Greenwich Observatory; it ranged from 6·4 inches in Leeds, to 10·7 and 13·0 inches in Plymouth and Bristol.

During the first nine months of 1876 the amount of rain measured at the Royal Observatory, Greenwich, was 13·7 inches, and was 4·5 inches below the average amount in the corresponding period of 61 years.

Fourth Quarter (*October, November, December*).—Till the 20th of October the weather was warm with frequent rain, the average excess of mean temperature was 5¼° daily; from October 21st to November 12th, it was mostly cold, with but little rain, the average deficiency of temperature was 3¼° daily, and from November 13th to the end of the year, with the exception of the six days December 21st to December 26th, the weather was warm, and at times very warm, with very frequent rain; the average daily excess of temperature for the 38 days ending December 20th was 4¼°; the average deficiency for the six days ending December 26th was

3¼° daily, and the average excess for the last five days of the year was 12¼°.

The most remarkable phenomena in this quarter were, the very small atmospheric pressure, the high temperature, and the extraordinary falls of rain in the month of December.

The mean temperature of the air in December was 44°·1, and back to 1771 there have only been nine Decembers in which the temperature has been so high.

The fall of rain in December was exceedingly anomalous. About London and its neighbourhood it amounted to nearly 6 inches, and back to 1815 there has been no instance of so great a fall in December; the previous instances of monthly falls equalling this amount nearly, were 7·0 inches in July 1828; 6·0 inches in October 1841; 6·0 inches in November 1852; 5·8 inches in June 1860, and 5·8 inches in July 1867. In the same period there was no instance of so large a fall in December as in the present year; the nearest approaches to it were in the years 1821 and 1868, when the falls were 5·2 inches and 5·4 inches respectively. The total fall in November and December was 8·9 inches, and back to 1815 there is but one instance of so large a fall in these two months, viz., in the year 1821, when it was 9·9 inches.

The following are the instances back to 1815, when the fall of rain in the quarter was as large as that in the present year, viz:—1821 it was 12·5 inches; 1822 it was 10·6 inches; 1824 it was 10·9 inches; 1841 it was 12·1 inches; 1852 it was 12·0 inches; and 1872 it was 11·3 inches.

At Greenwich the fall of rain in October was 1·6 inch, being 1·2 inch below its average; in November it was 3·1 inches, being 0·8 inch above its average; and in December was 5·8 inches, being 3·8 inches above its average; the *total fall in the quarter* was 10·5 inches, being 3·4 inches above its average.

These heavy and continuous rains produced great floods over low-lying land throughout the country, and agricultural operations were generally stopped. During December several severe gales took place, and caused a great many shipwrecks on our coasts, particularly at the times of the extreme low readings of the barometer.

The mean temperature of the air for the quarter was 47°·0, being 3°·3 and 2°·4 above the averages of the preceding 105 years, and 35 years respectively. In the preceding 105 years, the following are the only instances of so high a mean temperature of the quarter, viz.:—

In 1806 it was 48°·5 In 1831 it was 47°·1 In 1852 it was 48°·1
1818 ,, 47°·2 1847 ,, 47°·5 1857 ,, 47°·9
1821 ,, 47°·4

Meteorological Observations recorded at the Royal Observatory, Greenwich, in the First Six Months of the Year 1876.

1876. Months.	Temperature of Air. Mean.	Temperature of Air. Diff. from average of 105 years.	Temperature of Air. Diff. from average of 35 years	Temperature of Evaporation. Mean.	Temperature of Evaporation. Diff from average of 35 years.	Temperature of Dew Point. Mean.	Temperature of Dew Point. Diff. from average of 35 years	Temperature of Air—Daily Range. Mean	Temperature of Air—Daily Range. Diff from average of 35 years.	Temperature of Water of the Thames.	Elastic Force of Vapour. Mean.	Elastic Force of Vapour. Diff. from average of 35 years.	Weight of Vapour in a Cubic Foot of Air. Mean.	Weight of Vapour in a Cubic Foot of Air. Diff. from average of 35 years
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	grs
January ..	37·1	+0·6	−1·5	35·5	−1·6	33·2	−1·9	11·6	+2·0	39·2	0·189	−0·012	2·2	−0·2
February ..	41·1	+2·5	+1·9	39·1	+1·7	36·5	+1·6	10·4	−0·9	41·3	0·216	+0·011	2·5	+0·1
March ..	41·1	0·0	−0·6	38·5	−0·8	35·1	−1·3	14·1	−0·6	42·6	0·204	−0·012	2·4	−0·1
Means ..	39·8	+1·0	−0·1	37·7	−0·2	34·9	−0·5	12·0	+0·2	41·0	0·203	−0·004	2·4	−0·1
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	grs
April	47·2	−1·1	−0·0	44·0	−0·1	40·4	−0·2	18·2	−0·5	50·0	0·251	−0·003	2·9	0·0
May	49·4	−3·1	−3·4	45·1	−4·0	40·5	−4·8	22·4	+1·9	53·3	0·253	−0·048	2·9	−0·5
June	58·5	+0·3	−0·4	53·8	−0·7	49·6	−1·1	22·4	+1·3	61·4	0·356	−0·014	4·0	−0·1
Means ..	51·7	−1·3	−1·3	47·6	−1·6	43·5	−2·0	21·0	+0·9	54·9	0·287	−0·022	3·3	−0·2

Note.—In reading this Table it will be borne in mind that the *minus* sign (−) signifies *below* the average, and that the *plus* sign (+) signifies *above* the average.

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE LAST SIX MONTHS OF THE YEAR 1876.

1876. MONTHS.	Temperature of										Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.		Water of the Thames.				
	Mean.	Diff. from average of 105 years.	Diff from average of 35 years.	Mean.	Diff. from average of 35 years.	Mean.	Diff from average of 35 years.	Mean	Diff. from average of 35 years.		Mean.	Diff. from average of 35 years.	Mean.	Diff. from average of 35 years.
	°	°	°	°	°	°	°	°	°	°	in.	in.	grs.	grs.
July	65·9	+4·3	+3·8	60·2	+2·5	55·5	+1·6	24·9	+3·7	68·0	0·442	+0·025	4·9	+0·3
August ..	63·7	+2·9	+2·3	58·2	+0·8	53·6	−0·2	23·4	+3·6	67·2	0·412	−0·004	4·6	0·0
September	55·8	−0·8	−1·5	52·9	−1·2	50·2	−1·0	17·1	−1·4	59·3	0·365	−0·016	4·1	−0·1
Means ..	61·8	+2·1	+1·5	57·1	+0·7	53·1	+0·1	21·8	+2·0	64·8	0·406	+0·002	4·5	+0·1
	°	°	°	°	°	°	°	°	°	°	in	in	grs.	grs.
October ..	52·8	+3·2	+2.6	50·4	+2·2	48·0	+1·9	12·7	−2·1	56·3	0·336	+0·023	3·8	+0·2
November ..	44·0	+1·7	+0 5	42·2	+0·9	40·0	+0·5	10·6	−1·0	46·5	0·248	+0·001	2·8	0·0
December ..	44·1	+5·0	+4·0	42·8	+4·2	41·3	+4·5	7·5	−2·0	42·6	0·261	+0·041	3·0	+0·4
Means ..	47·0	+3·3	+2·4	45·1	+2·4	43·1	+2·3	10·3	−1·7	48·5	0·282	+0·022	3·2	+0·2

NOTE.—In reading this Table it will be borne in mind that the *minus* sign (−) signifies *below* the average and that the *plus* sign (+) signifies *above* the average.

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE FIRST SIX MONTHS OF THE YEAR 1876.

1876. MONTHS.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Daily Horizontal movement of the Air	Reading of Thermometer on Grass.				
										Number of Nights it was				
	Mean.	Diff from average of 35 years.	Mean.	Diff. from average of 35 years.	Mean.	Diff from average of 35 years.	Amount.	Diff. from average of 61 years		At or below 30°.	Between 30° and 40°.	Above 40°.	Lowest Reading at Night	Highest Reading at Night.
			in.	in.	grs	grs.	in.	in.	Miles.				°	°
January ..	85	− 3	30·095	+0·355	562	+ 9	1·1	−0·8	278	20	10	1	14·0	41·7
February ..	84	− 1	29·628	−0·171	549	− 4	1·5	0·0	375	13	10	6	17·0	44·8
March ..	80	− 2	29·391	−0·359	544	− 6	2·3	+0·7	429	11	18	2	18·3	42·7
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Means ..	83	− 2	29·705	−0·058	552	0	4·9	0·0	361	44	38	9	14·0	44·8
			in.	in.	grs.	grs.	in.	in	Miles				°	°
April ..	78	0	29·680	−0·091	542	− 1	1·3	−0·4	318	8	17	5	25·1	43·0
May	72	− 4	29·956	+0·173	545	+ 4	1·1	−1·0	279	9	16	6	25·3	44·5
June ..	73	− 1	29·816	+0·003	532	0	1·1	−0·9	235	0	7	23	32·1	55·8
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Means ..	74	− 2	29·817	+0·028	540	+ 1	3·5	−2·3	277	17	40	34	25·1	55·8

NOTE.—In reading this Table it will be borne in mind that the *minus* sign (−) signifies *below* the average, and that the *plus* sign (+) signifies *above* the average.

METEOROLOGICAL OBSERVATIONS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH, IN THE LAST SIX MONTHS OF THE YEAR 1876.

1876.	Degree of Humidity		Reading of Barometer.		Weight of a Cubic Foot of Air		Rain.		Daily Horizontal movement of the Air	Reading of Thermometer on Grass.				
MONTHS.										Number of Nights it was			Lowest Reading at Night.	Highest Reading at Night.
	Mean	Diff from average of 35 years	Mean.	Diff from average of 35 years	Mean	Diff from average of 35 years.	Amount	Diff. from average of 61 years.		At or below 30°	Between 30° and 40°	Above 40°.		
			in.	in	grs	grs.	in	in	Miles				°	°
July	69	− 6	29·902	+0·100	526	− 2	0·7	−1·9	240	0	1	30	38·6	58·0
August ..	70	− 7	29·768	−0·027	526	− 3	2·0	−0·4	263	0	3	28	34·1	59·7
September	82	+ 1	29·620	−0·187	532	− 1	2·6	+0·1	272	0	7	23	36·5	53·0
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Means ..	74	− 4	29·763	−0·038	528	− 2	5·3	−2·2	258	0	11	81	34·1	59·7
			in	in	grs.	grs	in.	in.	Miles.				°	°
October ..	84	− 3	29·756	+0·060	537	− 2	1·6	−1·2	240	1	9	21	28·6	55·9
November	86	− 2	29·702	−0·049	546	− 2	3·1	+0·8	248	9	12	9	21·6	48·2
December	90	+ 2	29·311	−0·494	539	−13	5·8	+3·8	316	4	20	7	20·3	47·1
							Sum	Sum	Mean	Sum	Sum	Sum	Lowest	Highest
Means ..	87	− 1	29·590	−0·161	541	− 6	10·5	+3·4	268	14	41	37	20·3	55·9

NOTE.—In reading this Table it will be borne in mind that the *minus* sign (−) signifies *below* the average, and that the *plus* sign (+) signifies *above* the average.

CORN: IMPORTATIONS, SALES, AND PRICES.

QUANTITIES of WHEAT, WHEATMEAL and FLOUR, BARLEY, OATS, PEAS and BEANS, IMPORTED into the UNITED KINGDOM in the Year 1876.

1876.	Wheat.	Wheatmeal and Flour.	Barley.	Oats.	Peas.	Beans.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
January ..	4,520,727	670,863	897,636	900,650	177,012	293,489
February	3,554,047	582,771	562,401	547,524	168,877	339,785
March ..	3,083,539	519,657	419,829	553,419	81,939	226,615
April ..	3,408,034	539,591	603,957	763,409	86,738	301,438
May ..	3,339,264	409,215	678,307	910,640	109,959	349,737
June ..	3,796,688	354,248	388,913	1,336,594	154,869	440,809
In first Six Months	21,702,299	3,076,345	3,551,043	5,012,236	779,394	1,951,873
July	5,593,948	384,366	331,406	1,089,760	67,402	450,610
August ..	4,589,311	415,479	365,800	1,269,550	171,333	629,532
September	3,039,506	438,234	928,356	990,332	80,913	421,494
October ..	2,872,278	604,163	1,579,023	998,079	103,429	432,718
November	3,539,245	578,422	1,659,354	1,202,263	246,678	388,018
December	3,057,565	445,531	1,355,093	642,368	160,848	326,961
In last Six Months	22,691,853	2,866,195	6,219,032	6,192,352	830,603	2,649,333
Year ..	44,394,152	5,942,540	9,770,075	11,204,588	1,609,997	4,601,206

NOTE.—The average weights *per quarter* of corn, as adopted in the office of the Inspector-General of Imports and Exports, are as follow .—For wheat, $485\frac{1}{3}$ lbs., or $4\frac{1}{3}$ cwts.; for barley, 400 lbs., or $3\frac{4}{7}$ cwts.; for oats, 308 lbs., or $2\frac{3}{4}$ cwts. Corn has been entered and charged with duty by *weight* instead of *measure* since September, 1864.

COMPUTED REAL VALUE of CORN IMPORTED into the UNITED KINGDOM in each of the FIVE YEARS, 1872-76.

	1872.	1873.	1874.	1875.	1876.
	£.	£.	£.	£.	£.
Wheat	26,046,876	28,446,689	25,201,062	27,418,970	23,140,766
Barley	6,194,155	4,010,344	5,266,096	4,630,654	3,745,420
Oats	4,212,086	4,804,118	5,118,785	5,407,928	4,619,427
Maize	8,696,362	6,621,720	7,484,178	8,112,158	12,744,432
Other kinds	1,747,073	1,788,716	1,959,237	2,304,218	2,555,397
Wheat Flour	4,092,189	5,839,197	5,709,820	4,828,167	4,729,206
Other kinds of Flour	9,883	10,570	14,405	12,130	15,474
Total of Corn ..	50,998,624	51,521,354	50,753,583	52,714,225	51,550,122

QUANTITIES of BRITISH WHEAT SOLD in the Towns from which Returns are received under the Act of the 27th & 28th VICTORIA, cap. 87, and their AVERAGE PRICES, in each of the TWELVE MONTHS of the YEARS 1871-76.

	QUANTITIES IN QUARTERS					
	1871.	1872.	1873.	1874.	1875.	1876.
	quarters	quarters.	quarters	quarters.	quarters.	quarters.
First month ..	267,827	194,719	183,987	187,106	210,661	154,367
Second month	309,376	193,910	202,977	189,031	223,974	188,539
Third month (five weeks)	377,003	245,612	238,125	206,145	292,172	208,367
Fourth month	293,494	191,522	159,268	150,725	233,970	160,868
Fifth month ..	222,003	231,780	225,595	175,715	234,683	174,153
Sixth month (five weeks)	229,749	268,626	219,750	172,298	216,016	188,611
Seventh month	120,154	109,543	101,101	95,871	121,684	90,626
Eighth month	123,889	126,769	96,986	82,564	135,456	88,030
Ninth month (five weeks)	371,590	295,774	266,856	323,153	199,314	314,327
Tenth month	367,672	264,934	265,122	248,984	226,503	216,393
Eleventh month	269,351	195,743	214,026	225,162	186,607	192,440
Twelfth month (five weeks)	322,756	263,152	285,648	335,339	234,035	225,254

AVERAGE PRICES PER QUARTER.

	1871		1872.		1873.		1874.		1875.		1876.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
First month ..	52	8	55	4	55	10	62	4	44	4	44	11
Second month	53	6	55	8	56	5	63	4	42	3	43	4
Third month (five weeks)	54	6	55	1	55	6	61	1	41	2	43	1
Fourth month	58	2	54	2	54	10	60	0	43	0	44	11
Fifth month ..	59	1	56	3	55	8	62	2	42	5	45	0
Sixth month (five weeks)	59	8	58	11	58	4	61	2	42	2	47	0
Seventh month	58	7	58	7	59	6	60	8	45	3	48	6
Eighth month	57	11	59	9	60	1	58	4	52	4	46	4
Ninth month (five weeks)	57	0	58	7	63	10	48	11	49	3	46	8
Tenth month ..	56	5	58	7	60	10	44	8	46	1	46	7
Eleventh month	56	2	56	11	60	9	43	11	47	4	48	0
Twelfth month (five weeks)	56	2	56	7	61	6	44	6	46	4	49	9

The **Average Prices** of Consols, of Wheat, of Meat, and of Potatoes; also the **Average Number of Paupers** relieved on the *last day* of each Week; and the **Mean Temperature**, in each of the Twelve Quarters ending December 31st, 1876.

	Average Prices.							Pauperism.		
Quarters ending	Consols (for Money)	Minimum Rate per Cent. of Discount charged by the Bank of England.	Wheat per Quarter in England and Wales.		Meat per lb. at the Metropolitan Meat Market (by the Carcass).		Potatoes (York Regents) per Ton, at Waterside Market, Southwark.	Quarterly Average of the Number of Paupers relieved on the *last day* of each week.		Mean Temperature.
					Beef.	Mutton.		In-door.	Out-door.	
1874	£.		*s.*	*d.*						°
Mar. 31	92	3·6	62	2	5¼*d.*—8¼*d.* Mean 6¾*d.*	5½*d.*—8¾*d.* Mean 6⅞*d.*	112*s.*—127*s.* Mean 119*s.*6*d.*	146,082	641,910	41·4
June 30	93	3·4	61	1	5*d.*—8*d.* Mean 6½*d.*	5*d.*—8¼*d.* Mean 6⅝*d.*	135*s.*—165*s.* Mean 150*s.*	133,846	614,738	52·8
Sept. 30	92⅝	3·0	55	5	5¼*d.*—8*d.* Mean 6⅝*d.*	5¼*d.*—7¾*d.* Mean 6½*d.*	75*s.* 6*d.*— 104*s.* 6*d.* Mean 90*s.*	129,996	592,958	60·9
Dec. 31	93	4·7	44	4	4⅞*d*—8¼*d.* Mean 6½*d.*	4¾*d.*—8*d.* Mean 6¼*d.*	73*s.*—96*s.* Mean 84*s.* 6*d.*	138,899	587,776	42·3
1875										
Mar. 31	$92\frac{6}{8}$	3·7	42	6	5*d.*—8*d.* Mean 6½*d.*	4¾*d.*—8*d.* Mean 6½*d.*	81*s.* 3*d.*— 111*s.* 3*d* Mean 96*s.* 3*d.*	146,708	622,652	39·5
June 30	$93\frac{6}{8}$	3·5	42	6	5¼*d.*—8¼*d.* Mean 6¾*d.*	5½*d.*—9½*d.* Mean 7½*d.*	80*s* 6*d* — 120*s.* 6*d.* Mean 100*s.*6*d.*	131,717	592,362	53·4
Sept. 30	94⅜	2·4	49	0	5½*d.*—8½*d.* Mean 7*d.*	5½*d.*—9½*d.* Mean 7½*d.*	70*s.* 6*d* — 93*s* 6*d* Mean 82*s.*	125,614	555,409	60·7
Dec. 31	94⅜	3·2	46	7	5½*d.*—8¼*d.* Mean 6⅞*d.*	6*d.*—9¼*d* Mean 7⅝*d.*	105*s* 6*d.*— 127*s.* 6*d* Mean 116*s.*6*d.*	136,124	546,251	43·1
1876										
Mar. 31	94⅛	4·1	43	8	5⅜*d.*—8*d.* Mean $6\frac{6}{8}$*d.*	$5\frac{4}{8}$*d.*—9*d.* Mean 7⅜*d.*	121*s.* 6*d.*— 151*s.* Mean 136*s.*6*d.*	145,088	558,026	39·8
June 30	$95\frac{4}{8}$	2·2	45	1	5*d.*—8⅜*d.* Mean 6⅝*d.*	5*d.*—10*d.* Mean $7\frac{4}{8}$*d.*	125*s.*—170*s.* Mean 147*s.*6*d.*	134,357	535,419	51·7
Sept. 30	95⅞	2·0	47	1	5⅜*d.*—$8\frac{4}{8}$*d.* Mean 6⅞*d.*	$5\frac{6}{8}$*d.*—$9\frac{6}{8}$*d.* Mean $7\frac{6}{8}$*d.*	..	130,349	517,196	61·8
Deç. 31	95⅝	2·00	48	2	$4\frac{4}{8}$*d.*—8*d.* Mean $6\frac{4}{8}$*d.*	5⅜*d*—9*d.* Mean 7⅛*d.*	..	141,907	514,739	47·0

The annexed Return shows the number of Beasts exhibited and the prices realised for them at the Christmas markets since 1843:—

Year.	Beasts.		Year.	Beasts.	
		s. d. s. d.			s. d. s. d.
1843	4,510	4 0—4 4	1860	7,860	3 4—5 6
1844	5,713	4 0—4 6	1861	8,840	3 4—5 0
1845	5,326	3 6—4 8	1862	8,430	3 4—5 0
1846	4,570	4 0—5 8	1863	10,372	3 6—5 2
1847	4,282	3 4—4 8	1864	7,130	3 8—5 8
1848	5,942	3 4—4 8	1865	7,530	3 4—5 4
1849	5,765	3 4—4 0	1866	7,340	3 8—5 6
1850	6,341	3 0—3 10	1867	8,110	3 4—5 0
1851	6,103	2 8—4 2	1868	5,320	3 4—5 8
1852	6,271	2 8—4 0	1869	6,728	3 6—6 2
1853	7,037	3 2—4 10	1870	6,425	3 6—6 2
1854	6,181	3 6—5 4	1871	6,320	3 10—6 2
1855	7,000	3 8—4 2	1872	7,560	4 6—6 0
1856	6,748	3 4—5 0	1873	6,170	4 4—6 6
1857	6,856	3 4—4 8	1874	6,570	4 4—6 8
1858	6,424	3 4—5 0	1875	7,660	4 6—6 6
1859	7,560	3 6—5 4	1876	7,020	4 4—6 4

AVERAGE PRICES of BRITISH WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER, in each of the SIXTEEN YEARS 1861–76.

Year.	Wheat.	Barley.	Oats.	Year	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.		s. d.	s. d.	s. d.
1861	55 4	36 1	23 9	1869	48 2	39 5	26 0
1862	55 5	35 1	22 7	1870	46 10	34 7	22 10
1863	44 9	33 11	21 2	1871	56 10	36 2	25 2
1864	40 2	29 11	20 1	1872	57 0	37 4	23 2
1865	41 10	29 9	21 10	1873	58 8	40 5	25 5
1866	49 11	37 5	24 7	1874	55 9	44 11	28 10
1867	64 6	40 0	26 1	1875	45 2	38 5	28 8
1868	63 9	43 0	28 1	1876	46 2	35 2	26 3

ACREAGE under each Description of CROP, FALLOW, and GREAT BRITAIN and

DESCRIPTION of CROPS and LIVE STOCK.	GREAT BRITAIN.		
	1874.	1875.	1876.
CORN CROPS:—	Acres	Acres.	Acres
Wheat	3,630,300	3,342,481	2,994,957
Barley or Bere	2,287,987	2,509,701	2,533,109
Oats	2,596,384	2,664,009	2,789,530
Rye	47,228	54,903	56,210
Beans	559,044	564,181	517,556
Peas	310,547	316,375	293,407
TOTAL CORN CROPS	9,431,490	9,451,650	9,184,769
GREEN CROPS .—			
Potatoes	520,430	522,653	505,088
Turnips and Swedes	2,133,336	2,142,698	2,145,573
Mangold	322,614	361,617	347,889
Carrots	13,927	14,936	16,129
Cabbage, Kohl-rabi, and Rape	169,285	189,733	179,475
Vetches, Lucerne, and any other crop (except clover or grass)	421,678	432,470	380,089
TOTAL GREEN CROPS	3,581,270	3,664,107	3,574,243
OTHER CROPS, GRASS, &c. :—			
Flax	9,394	6,751	7,641
Hops	65,805	69,171	69,999
Bare fallow or uncropped arable land	660,206	557,979	651,212
Clover and artificial and other grasses under rotation	4,340,742	4,354,071	4,540,273
Permanent pasture, meadow, or grass not broken up in rotation (exclusive of heath or mountain land)	13,178,012	13,313,621	13,515,944
LIVE STOCK —	No	No	No.
Cattle	6,125,491	6,012,824	5,846,302
Sheep	30,313,941	29,167,438	28,172,951
Pigs	2,422,832	2,229,918	2,293,620
Total number of horses used for agriculture, unbroken horses, and mares kept solely for breeding	1,311,739	1,340,129	1,374,576
Acreage of orchard, or of arable or grass-land, used also for fruit-trees	150,526	154,584	157,287
Acreage of woods, coppices, and plantations	2,187,078*	2,187,078*	2,187,078*

* As returned

GRASS, and NUMBER of CATTLE, SHEEP, and PIGS, in IRELAND, in 1874-75-76.

IRELAND			UNITED KINGDOM, including the Islands		
1874.	1875.	1876.	1874.	1875.	1876.
Acres.	Acres	Acres	Acres.	Acres.	Acres.
188,711	161,321	119,597	3,830,767	3,514,088	3,124,342
212,230	234,503	221,263	2,507,130	2,751,362	2,762,263
1,480,186	1,499,371	1,487,086	4,088,825	4,176,177	4,289,822
8,979	9,556	8,631	56,274	64,579	64,951
9,646	9,970	10,672	568,984	574,414	528,556
1,756	1,677	1,238	312,854	318,410	295,012
1,901,508	1,916,398	1,848,487	11,364,834	11,399,030	11,064,946
892,421	900,277	880,693	1,420,825	1,431,879	1,394,254
333,487	332,783	344,721	2,476,757	2,485,256	2,500,425
38,161	43,172	48,544	361,499	405,527	397,217
3,359	3,303	3,217	17,865	18,833	19,845
41,105	41,896	40,887	210,578	231,717	220,439
44,829	48,655	45,162	470,159	483,817	427,986
1,353,362	1,370,086	1,363,224	4,957,683	5,057,029	4,960,166
106,886	101,248	132,878	116,280	107,999	140,519
..	..	..	65,806	69,171	69,999
12,187	11,287	11,652	673,376	570,005	663,363
1,906,083	1,943,923	1,861,464	,284,925	6,337,953	6,441,184
10,472,161	10,431,776	10,507,249	23,680,416	23,773,602	24,053,273
No.	No	No	No	No	No.
4,118,113	4,111,990	4,113,693	10,281,036	10,162,787	9,997,189
4,437,613	4,248,158	4,007,518	34,837,597	33,491,948	32,252,579
1,096,494	1,249,235	1,424,143	3,537,354	3,435,167	3,734,429
468,089	470,442	479,502	1,847,148	1,875,851	1,863,419
..	..	..	..	..	..
325,173	325,173	324,028	..	..	..

in 1872.

CERTAIN ARTICLES of FOREIGN and COLONIAL PRODUCTION IMPORTED in the YEARS 1873-76; and their QUANTITIES.

	1873.	1874.	1875.	1876.
ANIMALS, Living:				
Oxen, Bulls, and Cows, number	157,549	157,821	224,969	227,478
Calves .. .. ,,	43,338	36,041	38,729	44,098
Sheep .. .. ,,	851,116	758,915	985,652	1,041,494
Lambs .. .. ,,				
Swine and Hogs .. .. ,,	80,976	115,389	71,928	43,558
Bones (burnt or not, or as animal charcoal) .. .. tons	69,945	82,242	97,162	85,135
Cotton, Raw .. .. cwts.	13,639,252	13,989,861	13,324,564	13,346,739
Flax .. .. ,,	2,194,473	2,373,993	1,765,068	1,404,661
Guano .. .. ,,	184,420	112,429	114,454	210,918
Hemp .. .. ,,	1,251,030	1,241,115	1,342,466	1,170,728
Hops .. .. ,,	122,729	145,994	256,444	167,421
Hides untanned: Dry .. ,,	615,548	554,964	552,629	469,460
„ „ Wet .. ,,	712,040	711,161	652,634	583,914
Petroleum .. .. tuns	65,630	85,630	77,661	100,175
Oilseed Cakes .. .. tons	138,193	157,718	180,379	190,225
Potatoes .. .. cwts.	7,506,615	3,986,662	4,696,132	6,031,341
Butter .. .. ,,	1,279,566	1,619,808	1,467,870	1,659,357
Cheese .. .. ,,	1,356,728	1,485,265	1,627,748	1,538,475
Eggs .. .. per great hundred	5,500,277	5,672,049	6,178,433	6,274,924
Lard .. .. cwts.	626,090	374,328	540,244	558,983
Bacon and Hams .. .. .. ,,	2,987,229	2,542,095	2,638,875	3,159,445
Salt Beef .. .. ,,	218,563	231,532	181,504	243,342
Salt Pork .. .. ,,	266,084	287,238	232,782	350,151
Clover Seeds .. .. ,,	278,419	256,025	306,551	387,099
Flax-seed and Linseed .. qrs.	1,445,938	1,682,048	1,961,987	1,998,130
Rape .. .. ,,	276,328	289,046	496,541	459,218
Sheep and Lambs' Wool .. lbs.	313,061,244	338,800,481	361,133,165	385,987,842

The QUANTITY and VALUE of DEAD MEAT IMPORTED in the 5 YEARS, 1871-5.

QUANTITIES

	1871.	1872.	1873.	1874.	1875.
	Cwts	Cwts	Cwts	Cwts	Cwts
Beef, Salted or Fresh	302,079	228,912	260,554	261,721	215,581
Meat, „ „	42,340	55,354	79,841	119,401	144,954
Total	344,419	284,266	340,395	381,124	360,535
Meat, Preserved otherwise than by salting	254,833	350,729	260,749	265,223	171,373
Total Dead Meat	599,252	634,995	601,144	646,347	531,908

VALUES.

	1871.	1872.	1873.	1874.	1875.
	£.	£.	£.	£	£
Beef, Salted or Fresh	635,533	420,258	519,815	523,326	454,337
Meat, „ „	107,814	138,272	216,681	335,846	419,019
Total	743,347	558,530	736,496	859,172	873,356
Meat, preserved otherwise than by salting	662,280	945,819	733,331	757,001	592,196
Total Dead Meat	1,405,627	1,504,349	1,469,827	1,616,173	1,465,552

The quantity of fresh, or salted dead meat, imported in 1875 was 360,535 cwts., against 381,124 cwts. in the previous year.

The falling off in preserved meat in 1875 was still more striking, only 171,373 cwt. being imported, against 265,223 in 1874.

The following remarks relating to Irish and Foreign Butter and to Cheese are extracted from 'The Grocer'.—

IRISH BUTTER.—In the first week of January, prices for Clonmels were 138*s.* to 148*s.*, and continued so until the last week, when they were 138*s.* to 150*s.*; the average prices of best Clonmels, and best first and second Corks were about 10*s.* lower than those of the corresponding time last year; with Limerick butter there was little doing. In the month of February, the quantity offered for account of shippers was small, but there were stale parcels sent from the country for re-sale on best terms, thus causing a wide range in prices: first Corks were 135*s.* to 148*s.* in the middle of the month, after that they were not quoted for the remainder of the season; Limericks throughout the month were at 115*s.* to 120*s.* The transactions in the month of March were so limited, that quotations were nearly nominal. Clonmels, &c., were quoted for the first two weeks at 120*s.* to 150*s.*; no quotations afterwards: Limericks were quoted only for the first week at 115*s.* to 125*s.* The transactions throughout the month of April were a mere nothing; neither Clonmels, Limericks, nor first and second Corks, were quoted. The transactions during the entire month of May were few, and confined almost entirely to low-quality Corks, for workhouse and other contracts; there were no quoted prices for either Clonmels or Limericks. There was a slight improvement in the demand in the month of June; the chief demand still rested upon low-quality Corks; the opening price for first Corks was 130*s.*, closing at 128*s.* In the month of July Irish butter was taken sparingly; the quoted rates for Clonmels, &c., 126*s.* to 128*s.*, advancing gradually to 130*s.* to 134*s.*; Cork firsts began at 128*s.*. and closed at 133*s.* The transactions in the early part of the month of August were very limited; the quoted rates for Clonmels, &c., in the first week of the month were 132*s.* to 130*s.*, gradually advancing to 142*s.* to 150*s.* at the close; first Corks began at 136*s.*, and finished at 148*s.* Cooler weather for the moving of *butter caused a little improvement in the sale of Irish in the* early part of September; a few Clonmels were sold at prices varying from 142*s.* to 152*s.*; first Corks began at 147*s.* to 150*s.*, steadily advancing to 155*s.* to 156*s.* at the close of the month. The quoted prices for Clonmels, &c., in the month of October were for the first three weeks 142*s.* to 152*s.*, and 2*s.* higher in the fourth week; first Corks began at 153*s.* to 154*s.*, and were 2*s.* higher for remainder of the month. The transactions during the month of November were very limited, the nearly nominal quotations were for best brands of Clonmels, Kilkennys, &c., 146*s.* to 154*s.* f. o. b.; Cork firsts at the beginning of the month were 152*s.* to 153*s.* landed, and 149*s.* to 150*s.* at the end; Limericks were almost neglected. The transactions during the month of December were very limited; the quoted prices for Clonmels, &c., were 146*s.* to 154*s.* early in the month, and 144*s.* to 150*s.* at the end.

FOREIGN BUTTER.—Supplies throughout the month of January were liberal, but not larger than usual; a considerable portion of these were of very doubtful character, that which could be relied upon commanded high prices: best Normandys, the first fortnight, were 154*s.* to 162*s.*, and closed at 160*s.* to 170*s.* In the month of February supplies were quite up to average, but in them were included large quantities of the adulterated descriptions, Normandys were steady; they began at 156*s.* to 166*s.* for best, and finished at 156*s.* to 164*s.* American was taken sparingly. The quantity received throughout the month of March was of a fair average, but a large portion of it was not justly entitled to be called foreign; quotations for best Normandys were 156*s.* to 170*s.* for first week, closing at 150*s.* to 156*s* The arrivals in the month of April were large; there was a steady demand for best brands of Normandys at 136*s.* to 140*s.* during the first week, and 140*s.* to 146*s.* during the last: best Jerseys in the early part of the month were 132*s.* to 136*s.*, at the close 128*s.* to 136*s.* The arrivals throughout the month of May were large, including that received by outports; best brands of Normandys were steady, the first fortnight at about 138*s.* to 146*s.*, the remainder of the month they ranged chiefly at about 128*s.* to 136*s.* Best Normandys began at 128*s.* to 136*s.* in the month of June, and gradually fell to 124*s.* to 128*s.* at the close; best Jerseys commenced at 104*s.* to 110*s.* Best

Normandys for the first week in July were 118s. to 124s., and for the last week 135s. to 140s. During the first week in the month of August, best Normandys were selling at 135s. to 140s., and the last week at 145s. to 150s.; best Jerseys were 120s. to 130s. for the first week. The arrivals throughout the month of September were liberal; best Normandys commenced at 148s. to 156s.; best Jerseys began 128s. to 140s., and finished at 126s. to 130s. The demand for best brands of Normandys during the month of October was active at steadily advancing prices; the quotations the first fortnight varied from 146s. to 156s., closing the last week at 158s. to 164s. For the month of November best Normandys in the first week were 158s. to 164s., closing at 146s. to 152s. Though the supplies were liberal during the month of December, the market had a drooping tendency; best Normandys commenced at 150s. to 156s, and closed at 146s. to 150s.

CHEESE.—Quotations throughout the month of January were—for best Cheshire, 75s. to 86s.; best Cheddar, 75s. to 94s.; best American, 60s. to 64s.; lower qualities, 30s. to 56s. Scarcely any variation in prices was noticed during the month of February; best Cheshire was 75s. to 88s.; best Cheddar, 82s. to 94s.; best American, 62s. to 64s. The only change worthy of note in March, was a great anxiety to press sales of low qualities; finest Cheshire varied from 80s. to 88s.; Cheddar, good to fine, 86s. to 94s. The quotations in the month of April were the same as in the preceding month, Cheshire varied from 40s. to 48s; best Cheddar, 86s. to 94s.; best American, 62s. to 64s. There were scarcely any variations in the month of May. There was also little variation in the month of June for English cheese; best Cheshire, 80s. to 88s.; best Cheddar, 86s. to 94s.; best American at the beginning of the month, 60s. to 62s. During the month of July there was still little variation in English prices: fine qualities held steadily, but middling qualities were freely offered at seemingly low rates—best Cheshire, 80s. to 88s.; best Cheddars, 86s. to 92s.; for American cheese there was a steady demand at from 50s. to 54s. In the month of August, holders of fine English were firm, but there was a difficulty in moving off good second-rates, and other useful descriptions; quotations for best Americans were 50s. to 54s. There was little change in the month of September; fine English held firmly; Cheshire varied in price from 50*s.* to 86*s.*; Cheddar from 60*s.* to 90*s.*; best American commencing at 54*s.* to 56*s.*, and closing at 58*s.* to 60*s.* The general prices for best Cheshire in the month of October varied from 74*s.* to 80*s.*; Cheddar varied in like manner—best, 84*s* to 90*s.*; for American there was a good demand at steadily advancing prices—best, 64*s.* to 66*s.* In the month of November fine English cheese held firmly; best Cheshire, 78*s.* to 86*s* ; best Cheddar, 86*s.* to 94*s.* In the month of December fine English was scarce, and firmly held; best Cheddar, 88*s.* to 94*s.*; best Cheshire, 80*s.* to 88*s.*; for American, prices varied little.

CORK BUTTER MARKET.—"During the early months of the year the business of this market was, of course, rather restricted, the real work of the season commencing in April, when the new grass-butter comes to hand, and the supplies become large and increase rapidly. Prices then opened at what would formerly have been thought the high figures of 160*s.* and 152*s.* for firsts and seconds; but these rates have of late years become the rule and not the exception. However, by the latter end of May they had fallen to 123*s.*, 114*s.*, and 107*s*, for first, second, and third qualities respectively; and this was the lowest point of the year. Any further fall was then checked by the great drought which set in, and which continued throughout the summer. The result was that from that time until the present the quotations showed (varied by very trifling fluctuations) one continued and gradual advance, so that the prices at the close of 1876 were almost the highest for the season. The receipts of butter to the market, notwithstanding the drought, contrasted favourably with those of 1875 (which latter were the heaviest of any year on record), the total of each being—1875, 433,281 firkins; 1876, 389,000 firkins."

STATISTICS OF DAIRY PRODUCE.

(*The following Quotations, &c., are extracted from* 'The Grocer.')

PRICES CURRENT on 1st SATURDAY in JANUARY of each YEAR, from the latest actual MARKET SALES.

	Average Annual Price in the 5 years, 1870–74.	1875.	1876.	1877.
	Per cwt.	Per cwt.	Per cwt.	Per cwt
Butter:				
Carlow, finest, F.O.B.	126s. to 136s.	150s. to 160s.	138s. to 148s.	140s. to 150s.
,, Landed	124 ,, 138	.. ..	138 ,, 148	.. ..
Cork, 1sts	138 ,, 143	158 ,, 160	146 ,, 150	150 ,, 162
,, 2nds	129 ,, 135	151 ,, 154	136 ,, 142	140 ,, 148
,, 3rds, new	111 ,, 116	131 ,, 132	110 ,, 112	119 ,, 120
,, 4ths	98 ,, 98	115 ,, ..	81 ,, ..	90 ,, 91
Limerick	117 ,, 121	.. ..	118 ,, 120	130 ,, 138
Foreign:				
Friesland	113 ,, 130	136 ,, 144	135 ,, 140	136 ,, 140
Jersey, &c	79 ,, 129	94 ,, 144	80 ,, 136	80 ,, 132
Kiel	111 ,, 145	135 ,, 164	.. ..	.. ..
Normandy	93 ,, 150	110 ,, 160	90 ,, 162	100 ,, 150
American	82 ,, 115	112 ,, 138	90 ,, 118	95 ,, 136
Cheese:				
English Cheddar, fine, new	76 ,, 90	74 ,, 94	74 ,, 92	60 ,, 94
,, good, new	74 ,, 93	.. .	.. ..	.. ..
Red Somerset Loaf ..	68 ,, 81	78 ,, 88	76 ,, 86	.. .
White or yellow Cheddar Loaf	72 ,, 81	80 ,, 88	76 ,, 86	.. ..
Scotch Cheddar ..	67 ,, 77	74 ,, 82	64 ,, 76	64 ,, 80
Cheshire, new .. .	76 ,, 87	84 ,, 88	76 ,, 86	78 ,, 90
,, good ditto .	58 ,, 70	70 ,, 76	50 ,, 70	46 ,, 70
Wiltshire, new	67 ,, 78	70 ,, 82	62 ,, 78	74 ,, 82
,, good ditto	57 ,, 64	66 ,, 68	.. ..	. .
North Wilts Loaf, new	66 ,, 80	78 ,, 88	74 ,, 86	. ..
Derby ,, ,, ..	65 ,, 83	76 ,, 88	76 ,, 86	80 ,, ..
Foreign:				
American, fine	68 ,, 73	72 ,, 76	62 ,, 64	66 ,, 72
,, good	54 ,, 65	50 ,, 68	30 ,, 58	46 ,, 60
Gouda	49 ,, 64	52 ,, 60	56 ,, 62	50 ,, 62
Kanter	.. ..	.. ..	.. ..	.. ..
Edam, new	53 ,, 68	54 ,, 64	60 ,, 70	60 ,, 68

QUANTITY and VALUE of BUTTER IMPORTED from DENMARK, 1865–75.

Years	Quantities	Computed Real Value.
	Cwts	£.
1865	65,555	362,440
1866	67,305	319,528
1867	80,589	422,479
1868	79,437	471,262
1869	103,613	574,981
1870	127,013	767,190
1871	140,851	803,226
1872	173,574	1,009,322
1873	201,558	1,203,459
1874	226,053	1,363,433
1875	206,171	1,275,870

STATEMENT of the QUANTITY and VALUE of BUTTER imported from the UNITED STATES, BELGIUM, FRANCE and HOLLAND; and of CHEESE imported from the UNITED STATES and HOLLAND, 1865–75.

Years.	UNITED STATES.			
	BUTTER.		CHEESE	
	Quantities.	Computed Real Value.	Quantities.	Computed Real Value.
	Cwts	£	Cwts.	£.
1865 ..	83,216	437,703	442,913	1,296,204
1866 ..	16,059	77,754	415,726	1,386,447
1867 ..	39,035	113,290	526,740	1,470,017
1868 ..	7,117	37,279	489,117	1,439,380
1869 ..	17,203	84,603	487,870	1,612,325
1870 ..	16,915	80,928	555,385	1,861,263
1871 ..	83,775	394,359	731,326	2,014,805
1872 ..	45,765	199,679	598,198	1,701,435
1873 ..	43,406	199,639	790,238	2,353,181
1874 ..	36,307	188,769	849,933	2,589,776
1875 ..	40,331	205,900	958,978	2,786,027

Years	BELGIUM		FRANCE	
	BUTTER		BUTTER.	
	Cwts.	£.	Cwts	£.
1865 ..	70,619	433,179	353,115	1,867,085
1866 ..	76,667	426,712	452,196	2,276,493
1867 ..	80,754	470,464	450,693	2,265,147
1868 ..	70,456	405,987	393,578	2,156,824
1869 ..	85,789	481,609	407,432	2,231,450
1870 ..	84,408	516,643	289,692	1,672,899
1871 ..	94,539	523,460	304,683	1,636,006
1872 ..	74,191	409,555	355,089	1,916,795
1873 ..	76,610	439,501	446,550	2,409,861
1874 ..	76,723	465,517	713,251	3,944,233
1875 ..	79,950	499,028	567,560	3,387,219

Years.	HOLLAND.			
	BUTTER.		CHEESE.	
	Cwts.	£.	Cwts.	£.
1865 ..	345,026	1,886,486	386,962	1,100,037
1866 ..	383,225	1,979,070	426,559	1,317,231
1867 ..	326,217	1,733,459	332,628	961,245
1868 ..	343,322	1,992,414	329,565	959,547
1869 ..	415,176	2,253,420	426,913	1,262,101
1870 ..	406,795	2,388,459	422,553	1,204,830
1871 ..	390,616	1,986,708	348,148	954,236
1872 ..	269,091	1,358,579	329,535	942,537
1873 ..	279,004	1,453,875	336,654	1,013,233
1874 ..	351,605	1,877,755	398,888	1,164,921
1875 ..	357,106	1,917,910	370,123	1,078,594

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

I.—*Report on the Agricultural Implements at the Philadelphia Centennial Exhibition.* By J. COLEMAN, of Riccall Hall, York, British Juror, and Chairman of Group 28, "Agricultural Machinery."

THE readers of the 'Journal' will naturally compare the Reports of the Vienna and Philadelphia Exhibitions as described in these pages. Let me admit at once that in one important feature my story of the latter will be defective. I cannot dwell with pride and satisfaction on the exhibition of English inventions, the description of which occupies so important a position in Professor Wrightson's pages, not because of any want of merit, but because they were not at Philadelphia. It will be remembered that a meeting of implement makers was held during the Taunton Show, presided over by Mr. Samuelson, when it was pretty generally determined not to exhibit at Philadelphia, for the following reasons:—1st, because it was felt that an American trade was impossible, on account of the high tariff which at that time applied to all goods whether sold or not; 2nd, of the serious outlay that would be incurred in sending heavy goods; 3rd, that it was deemed unwise in the face of these objections to expose English inventions to the sharp eyes of American inventors. Consequently we, who made such a creditable display in our general collection—in the Machinery department and in Fine Arts—as to rank at the head of contributing countries, were, as regards agricultural machinery, represented by some dozen exhibitors, many of whose entries were of an unimportant character. From the empty space originally devoted to this country, it was evident that even some of those who had entered had withdrawn. It is not for me to question the wisdom of this decision. Makers should know their own business better than an outsider; but looking at the subject from an outside position, I am inclined to think that one important consideration was overlooked by the makers, *viz.*, *that the world would be present at the world's fair, and especially would the great South American countries be represented.* Hitherto I believe that the bulk of their imports have come from England. The field has now been left open to American enterprise, and I cannot doubt, from what I saw, that it will be taken advantage of. A comparison between the two great exporting countries of the world would have been highly interesting, and probably not to our disadvantage; for though, in point of ingenuity and adaptability to the objects required, the Americans are certainly in advance of others, in construction and quality of work our best makers are superior. Our exhibition was saved from absolute mediocrity by the presence of two traction-engines and a roller of Aveling and Porter's; a couple of engines, portable and stationary vertical, by Davy, Paxman, and Co., of Colchester; a small vertical engine and drum-guard. by Fison; tools; bee-hives, &c. The traction-engines were shown at Schencks Station during the trials of threshing-machines and portable engines; the one with crane-attachment loading and unloading the heavy goods with the greatest ease, and bringing up the machinery as required to the testing apparatus. The more powerful engine was employed as the motive power during the experiments. Unfortunately these trials did not attract many spectators; all who were present were unanimous in their approbation of the work done, and the ease with which, whilst going at full speed, the engines could be steered to a nicety. Hitherto such machines have been little used in the States. The time may come, however, when the farmers of the Prairies will find it advantageous to adopt steam both for cultivation and traction purposes.

The same reasons which influenced English makers probably had some effect on other European countries, for their contributions were limited, being principally from France, Germany, Austria, Sweden, and Russia. The strength of the Exhibition was in the American and Canadian sections; the latter making a most creditable display, astonishing the world, not only in this, but in other departments, by the steady solid progress that was visible. It is probable that this completeness was due in no inconsiderable degree to the liberality of the Dominion Government in offering additional prizes,—bronze, silver, and gold medals; the adjudication of which was confided to the English Judges, who very willingly undertook this agreeable duty.

Of the American Exhibition it is unnecessary to speak now, as I hope by my description of the more prominent and interesting features to convey a due idea of its variety and completeness.

Before, however, doing so I may be permitted to allude very briefly to the method adopted by the Centennial Commission *with regard to awards and the work of the Judges, which differed in some important particulars from that pursued at any previous* exhibition, and appears to me to possess valuable advantages. Hitherto the awards have been made by an international jury, which at Vienna amounted, I believe, to 600 members, chosen from the various countries generally, on the basis of the relative space occupied by each. This grand jury was divided into numerous small juries, who examined the products, prepared lists of such as were deemed worthy of award, and such were confirmed or rejected by higher juries. The awards consisted of medals of different values. Such an arrangement was considered by the Centennial Commission defective for the following reasons:—Countries nearest to the Exhibition occupying large spaces had the larger proportion of jurors, whereas countries occupying less space were not so well represented, in many cases having no juror at all. Written reports were not usually made, and if made were not published, so that, save by the nature of the medal, no one outside the jury was informed for what particular merit the awards were made. To quote the words of a Report on the subject from the Hon. N. Beckwith, Commissioner from New York:—"Medals at best are enigmas. They express nothing exactly and definitely relative to the products exhibited; their allegorical designs doubtless have a meaning in the mind of the artist who makes them, but allegorical designs are primitive and feeble language, and the medal of to-day is no more than its predecessor, a school-boy token. Verdicts upon products determined by majority of votes of juries in which the producing countries are often represented by useless minorities — awards based upon anonymous reports, or reports never published, and final decisions announced and recorded in the vague and mystic language of medals, have not proved satisfactory to producers or the public. As regards the diffusion of reliable and useful information, International Exhibitions have not come fully up to expectations and to the promise implied in the great labour and great expenses which they involve; and the wide-spread dissatisfaction which has uniformly followed the close of Jury-work, affords in itself strong evidence that the system is not well adapted to the purposes of International Exhibitions."

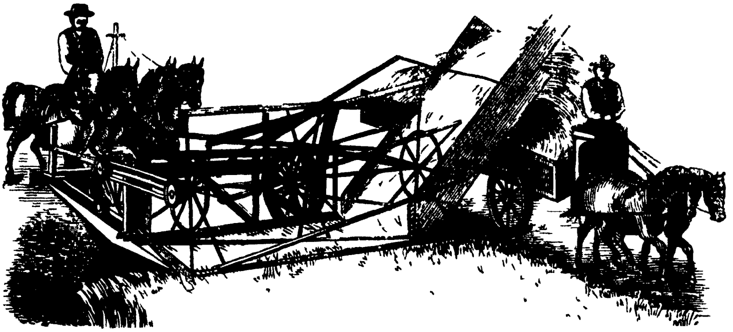
At Philadelphia the work was entrusted to 250 Judges, half foreign. The latter were selected by their own Governments as specially qualified to deal with particular departments. The judges were not empowered to make awards, which was done by the Centennial Commission; but they were required to report in writing on such exhibits as they deemed worthy, giving all the necessary particulars to justify their action. According to the instructions, the reports were to be based upon inherent and comparative merit. The elements of merit to include considerations relating to originality, invention, discovery, utility, quality, skill, workmanship, fitness for the purposes intended, adaptation to public wants, economy, and cost. Awards to consist of a diploma, with a uniform bronze medal, and the special report of the Judges on the subject of the award. Each exhibitor has the right to publish the report. The value of these reports will depend upon the qualifications for the work of the reporting Judge. If the work is well done, there can be no doubt as to the estimation which the reports will acquire at the hands of the exhibitors and the public, and they can hardly fail to present valuable references when collected and published by the Commission, with a General Report of each group, which was also supplied by the Judges. Judging by my own experience, I am inclined to regard the arrangements of the Commission as a decided advance upon previous Exhibitions. The best means were adopted to secure competent authorities for each group. The system was devoid of competition between different countries; and as one result, by no means unimportant, the work was conducted with great cordiality, and with a desire to give full credit to all. It remains to be seen how far the expectation of the Commission will be verified by results. Every scheme, however carefully matured, has its practical drawbacks; but, looking at the honest conscientious work that was done at Philadelphia, this scheme should be a success.

HARVESTING MACHINERY.

In this Report I do not propose to follow out the order laid down for the guidance of Judges, which classified the exhibits as they would be required in practice, commencing with implements of cultivation, following with drills, and so on. I take those first that are likely to be most interesting to my readers. The first thing that would strike the English visitor as remarkable would be the variety of inventions for reaping. In England we only know of two or three forms—the Manual Reaper, the Swathing Machine, now little used, and the Self-delivery Sheafing-machine—which latter is most generally employed. Whereas in the Philadelphia Exhibition I found six distinct forms, each largely employed for its particular purpose. Nothing gives a better idea of the vastness of the country, and the variety of its requirements, than this array of machinery. Thus we find a totally distinct class of machinery used in the Western States from what is required for the Eastern. In California, for example, there is a large trade done in *Headers*.

Headers.—These peculiar machines are constructed to cut the corn at varying heights, though they are generally set so as to sever it midway. A large reel working above, and in a line with the knife, brings the corn upon a transverse revolving web, which carries it up an incline sufficiently high from the ground and clear of the machine to allow the severed heads to fall into a low waggon or rolly, which is driven alongside the machine and receives the corn, without any manual assistance in loading, the skill of the driver alone being necessary to alter the position of the waggon as required. The corn is taken to the barn, and either stored or immediately threshed out. Sometimes it is simply made into a large heap, and it is not uncommon in the great wheat district of California to see the produce of large areas thus collected without any protection from weather. The machine is propelled from behind, as in the Crosskills reaper, by four horses. The driver's seat at the end of the pole helps to balance the frame. The only machine of this kind in the Exhibition was shown by Walter A. Wood, of Hoosich Falls, New York. The width of cut varies from 10 to 16 feet. The knife-bar and connecting rod are both of wood. Width of apron, 4 feet 2 inches. In a country where the corn stands up well, and where the climate is so fine that the grain is ready for threshing as soon as it is cut, such machines are of great value, on account of the celerity with which the work can be accomplished. The largest-sized machines can clear 45 to 50 acres a day. Straw in these favoured localities is rather an incumbrance to be got rid of, than a valuable product to be saved. Hence it is a great advantage to leave so large a proportion behind either to be burnt or buried. I can imagine much waste in case of wind, but probably this is seldom experienced; anyhow, I understand that Mr. Wood sells a large number both for California and Oregon,

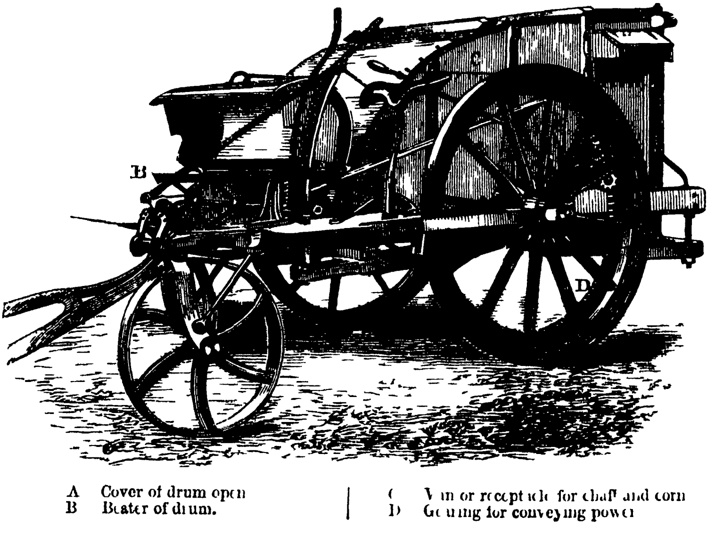
Fig. 1.—*Mr. W. A. Wood's Header at work.*



where they are universally used. The illustration (Fig. 1) requires no explanation. The representation is very good, with this exception—that the corn does not appear to be cut so high as is actually the case. The stubble is not shown. It will be noticed that the reins are passed through, or hung on, a cross-bar on the standard, so as to be easily handled by the driver. It should be understood that the knife-bar and the reel are readily adjustable, so as to suit variations of crop.

Whilst on this subject I may notice a clumsy, nondescript-looking machine, which was shown in the South Australian Section, and which, through the kindness and enterprise of Mr. Samuel Davenport, the Commissioner for South Australia, I had an opportunity of seeing tried at Schencks Station, the scene of the reaping trials. The machine, of which I present a good illustration, is a combined reaper and thresher, the invention of one Ridley, and is thus spoken of in Mr. Harcus's work on 'South Australia':—"The greatest invention ever produced for the agriculturists of South Australia is Ridley's Reaping-machine, which reaps and threshes the wheat by one simple process. A machine of this kind could be used only where the climate is dry, and where the grain is allowed to ripen and harden in the ear. In some of the Australian colonies the machine cannot be used, in consequence of the moisture in the air. In South Australia, however, as soon as the crop is

Fig. 2.—*Side view of Ridley's Reaping-Machine, showing how speed is obtained.*



A Cover of drum open
B Beater of drum.
C Van or receptacle for chaff and corn
D Gearing for conveying power

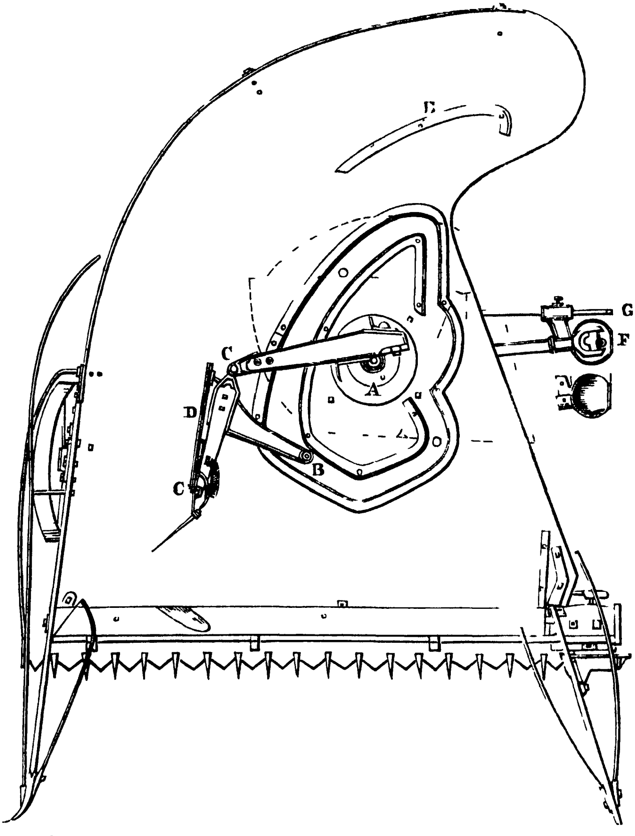
fully ripe, the machine is put into the field, and the wheat is reaped and threshed with amazing rapidity, and at a very small expenditure." The machine had a fair trial. The grain was so ripe that the heads hung down and became somewhat entangled; a fact that partly accounted for the frequent chokings and ultimate stoppage of the trial. It is impossible to say how it might answer in South Australia, but a ripe crop and perfectly fine weather ought to have been favourable conditions.

The drawing does not illustrate the heading apparatus. This consists of a fine comb with a number of sharp teeth. These teeth, catching the grain just below the heads, causes the fracture of the already brittle straw, and the suction produced by the revolution of the beaters causes the heads to be drawn into the drum—a cylindrical box, of which the front lid in the picture is raised in order to show the beaters, &c. As the corn is threshed it is blown through a concave by the force of the wind, and grain and chaff accumulate in the van-like carriage; a wire screen in the back allows of the escape of dust, dirt, &c. By a recent addition, which was not shown at Philadelphia, a winnowing apparatus is attached, and the process is completed. The ordinary method of working the machine is to empty out the products at the land's-end into a tarpaulin, where the winnowing and sacking take place. Three or four horses are used to draw the machine yoked abreast, in which position it would be impossible to avoid trampling on the corn. I do not pronounce against this machine, which appears so highly esteemed at home, but I cannot see why a reciprocating knife and small reel arrangement should not be substituted for the comb, which is at best a very clumsy contrivance. This would ensure good cutting, and as a great deal of power is expended in the threshing operation, it is a question whether a good form of header would not be more economical, for the work in the field would be more expeditious. To return to what is:—the drum is driven from gearing on the near-side driving-wheel, and the frame can be raised or lowered by a rack and screw to suit the height of the crop. The idea is to separate the ear with as little straw as possible, and it stands to reason that the machine will answer best in crops of uniform length. If they are uneven or beaten down, it must prove a failure. If it can be made to work as described, although there must be great waste, yet the expedition of the process would render it desirable in a country where labour has hitherto been the great difficulty.

Table-Rakes.—The next description of reapers I have to notice are known as Table-Rakes, which are similar in delivery to self-raking reapers, only the revolving rakes, &c., are replaced by a single rake which travels on the table itself. Two of such machines require notice: viz. the Buckeye Table-Rake, of Aultman, Miller and Co., of Akron, Ohio, and Walter A. Wood's Chain Rake Reaper. The former is made as a combined mower and reaper by detaching the table-gear and supplying a separate knife-bar.

The following illustration gives a good idea of the appearance of the reaper (Fig. 3.) It will be seen that it is a forward-cut

Fig. 3.—*Plan of Aultman, Miller and Co.'s Table-Rake.*



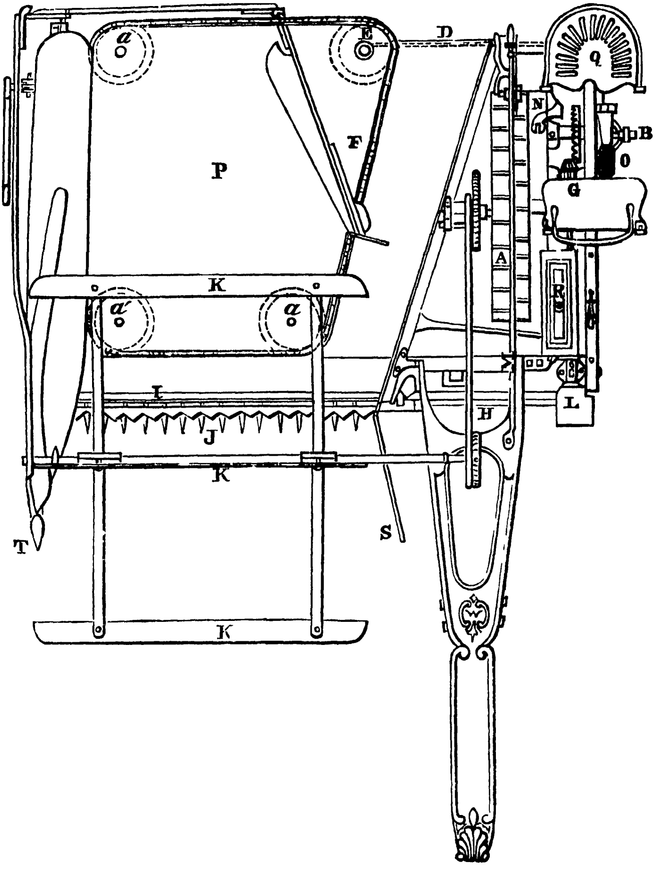
A	Bevel gear	E	Cam to keep compressing board parallel with outside wall
B	Roller	F	Coupling on end of shaft
C C	Hinges	G	Rear support
D	Compressing board		

Dotted outline shows position of sheet iron cover

machine. The table-rake is driven by shaftings with universal joint and bevel gearing; its orbit is determined by a cam on the centre of the table, which is protected from the falling corn by a hinged cover, the hinged portion making way for the rake as it comes round to the front. The rake works continuously, or can be arrested at any point of its traverse by leverage from the driver's foot, thus the size of the sheaves can be regulated according to the crop, and the bundle can be carried on the table round a corner as far as is desired. The light-reel rake in front is adjustable as to height; it is driven by chain-gear, and is of course quite independent of the table-rake. An advantage is claimed for this entire separation; the reel-arm being always parallel with the cutter-bar, its motion is uniform throughout, and the corn is delivered at right angles to the cutter-bar and not diagonally: it results that the table-rake compressing the corn into a bundle, as shown in the drawing, delivers it in a more compact form for binding. Of this I had ocular proof during the trials at Schencks Station. The men employed in binding the grain were unanimous in their opinion that the sheaves made by the table-rake were easier to bind than from any other machine. The disadvantages of the table-rake appear to be that as the rake compresses the grain at the corner of the table, there is some risk of loss from shedding in over-ripe corn, and the closeness of the sheaf interferes with the drying effect of sun and wind, when the corn is cut green. The draft appeared moderate, and the machine was very steady in work. I can imagine that, for moderately light crops, the Buckeye table-rake will be a valuable invention. The machine is light and strong, the sliding spring seat for the driver being especially commendable, as also the careful way in which the gearing is protected.

Through the courtesy of Mr. Walter A. Wood, I am enabled to present my readers with detailed drawings of the Chain-Rake Reaper, a machine which has meritorious points, but which unfortunately delivered the sheaves, when on trial, too directly in the rear of the machine to allow of a clear track for the horses. The figure (No. 4, p. 10) shows a plan of the machine. The letters and explanation will fully explain the action. The end of the jointed rake (F) travels round the outside of a nearly square platform in the same line as the travelling-chain to which it is attached, collects the corn into a close bundle, and throws it off, the action of the joint and flexible arm tending to collect the corn with great facility, like the sweep of the human arm. I understand that these reapers are largely sold, and I can believe that, when properly adjusted, they are capable of doing good work. The frame is of wood, strongly made. The motion is communicated to the chain by universal joint and bevel gearing, and as the cross-shaft can be thrown in and out of gear by a lever from the driver's seat, the traverse of the rake can be arrested at any point.

Fig. 4.—*Plan of Wood's Chain-Rake Reaper.*

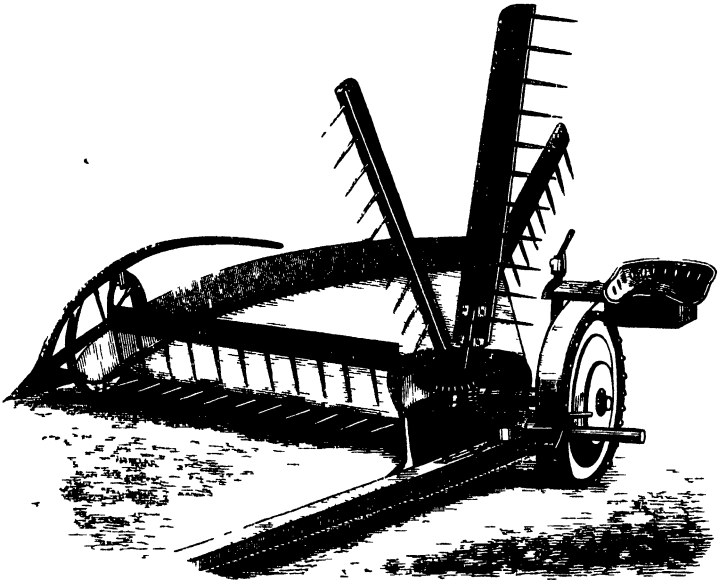


A	Drive-wheel with internal spur-gear	N	Shifting-lever, throwing B in and out of gear
B	Cross-shaft	O	Foot-lever, operates clutch on B
D	Rake-shaft	P	Platform
E	Chain-wheel, driven by bevel gear	Q	Seat
F	Rake	R	Tool-box
G	Crank-shaft, driven from B	S	Inside grain-divider
H	Pitman	T	Outside do do
I	Sickle-bar	U	Grain-wheel
J	Guards.	*a a a*	Chain-wheels at the corners of P, for the purpose of changing the direction of the motion of F
K	Reel driven by chain on axle of A		
L	Shield to protect crank		
M	Tilting lever, to regulate height		

Sweep-Rakers.—The majority of the reaping-machines shown at Philadelphia, and publicly worked at Schencks Station, were of the sweep-rake order, mostly using the gear patented by the Johnston Harvester Company, or some modification of it, whilst the Dorsay Rake was in request in some quarters. It is not my intention to enter into detail in each case, because I am writing for the English reader, and, without disparagement to American and Canadian enterprise, I think that he can supply his wants as regards this class of machinery better at home than abroad. I shall notice only such machines as appear to possess novelty.

The Royce Reaper, manufactured by two or more firms in the States, and also in Canada, is remarkable for lightness and efficiency. That which was tried, and which was shown by J. S. Royce, Centenary, New York, weighed only 435 lbs., and has the following features: a spokeless wheel, solid outside, having the cogs cast upon the inside of the disc. The axle is fast to the wheel, and is connected with a universal rod, which drives the rake-shaft by bevel gear. The knife-bar is nearly in a line with the axle, the connecting-rod being short, and the crank is packed inside the wheel. It will be seen that the rake-shaft or standard is thus in the same direction as the knife. The standard is very low, and consequently the rakes drop on the table in a line nearly parallel with the knife-bar. The consequence is, that the grain is laid very evenly on the table, and deposited in neat bundles, suitable for tying. Each rake-arm is furnished with teeth, and is jointed; and by a clever mechanical arrangement can either be made rigid, in which case it acts as a rake, or turns at right angles, so that the teeth feather away from the platform: a very pretty motion, which can be either automatic or controllable at will by a leverage from the driver's foot. It will be seen by the drawing that the driver's seat extends outside the wheel, its standard being fixed into the back part of the pole. The driver's weight balances the machine; and this, and the position of the draft, which is taken from a point

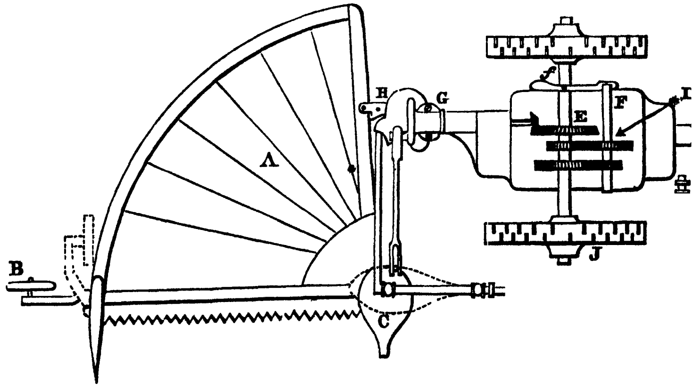
Fig. 5.—*View of the Royce Reaper.*



below the pole, where the main brace which carries the cutter-bar joins the pole, counteracts side-draft. No scientific tests were applied, either as to direct or side-draft; but from the ease with which the horses did their work, very moderate draft was evident. For light, fairly upright crops, I think highly of the Royce Reaper. The pole is the only wooden part, the frame being cast in one piece. The rake-gear is very simple, and, as far as we could judge from the light crop which was operated on, fairly efficient. As will be seen (Fig. 5), the rake-head is driven by bevel gearing. The opposite arms are coupled together, and their action as clearers or collectors depends upon the action of a lug, which, when in operation, throws round the jointed or hinged head, producing the feathering action. The reaper is sold retail for 115 dollars, which is equal to about 23*l.*

L. D. Sawyer and Co., of Hamilton, Ontario, exhibited a Combined Mower and Reaper, which deserves notice, on account of several peculiarities. The wheels and frame are entirely cast metal. Gearing from the steel axle, 1⅝ in., is put in and out of work by an eccentric. The knife is driven by bevel gearing, with a self-adjusting ratchet on both wheels without springs or pauls. The inside wheel is cast 1 inch larger than the outside one, with the view to relieve the side-draft. The main frame is cast in one piece, and there are only two bolts in the machine; but the principal peculiarity is the way in which the knife-bar is suspended or hung upon the drag-bar. The latter is made in one piece with the brace-bar, and hinged to the machine by ball-and-socket joint, which allows the finger-bar to work automatically, and always maintain its position in a right line. The draw-bar itself forms an alignment-rod for keeping the finger-bar and pitman always in line; this will be better understood by reference to the illustration (Fig. 6), which also shows another very commendable feature, viz., the form in which the table is placed for travelling. All that is required is to detach the pitman from the knife, uncouple the shoe from the draw-bar, the table is then swung round to the rear, and a pin through the table and clip holds it fast. The rakes work on John-

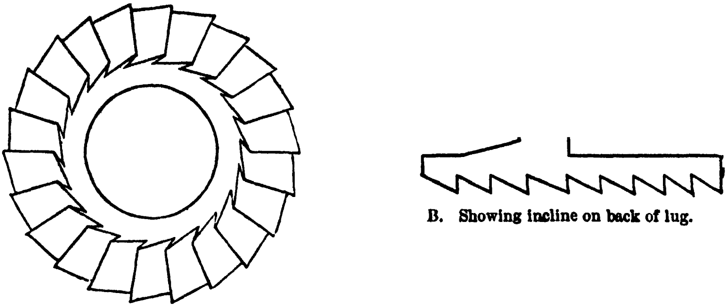
Fig. 6.—*Plan of L. D. Sawyer's Reaper.*



A. Position of table, when folded.
B. Ditto of castor-wheel, when table is swung round for transportation
C Position of shoe, when swung round.
D. Draw-bar.
E. Bevel-gear driving knife-gear.
F. Eccentric shaft for throwing in and out.
f. Handle of shaft.
G. Only two bolts in machine.
H. Clip to hold table when folded.
I. Main frame, in one piece.
J Inside wheel, one inch larger than outside wheel.

stone's principle, being driven by square-linked chain-gear from the main axle and bevel wheels. The rake-standard is wrought iron; the gearing very compact and well shielded. Fig. 7 represents a plan of the self-adjusting ratchet, with the incline on the back of the lug, by which the action is effected. I regret that no trial of this machine was made in the field; so far as could be judged from examination, it appeared likely to work well, and it certainly possesses sufficiently novel details to justify notice.

Fig. 7.—*Self-adjusting Ratchet of L. D. Sawyer's Reaper.*

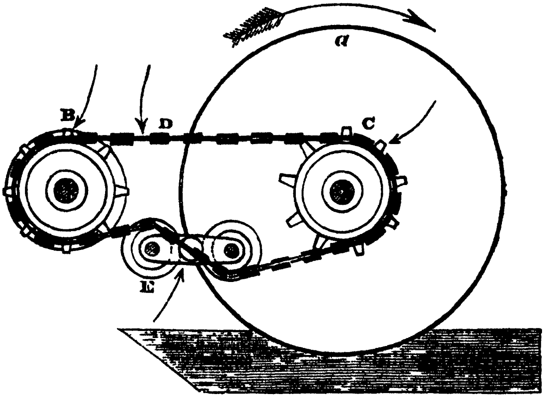


A. Self-adjusting ratchet.

B. Showing incline on back of lug.

The Johnston Harvester Company, of Brockport, New York, exhibited four different machines, all of which made good work. One of these, somewhat out of the ordinary run, inasmuch as the crank-wheel was horizontal instead of vertical, took a width of 6 feet. The Wrought-Iron Harvester and the Combined Machine, of similar construction, appear valuable machines, specially adapted for export. I believe that one of the former competed

Fig. 8.—*Chain-gear of Johnston Harvester Co.'s Reaping Machine.*



a. Travelling-wheel.
B. Pinion on rake-shaft.
C. Sproggle-wheel on axle of driving-wheel.
E. Self-lightening lever, by roller and springs.

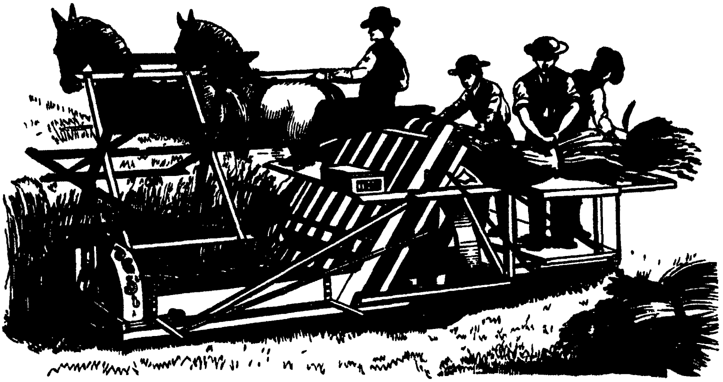
at Leamington. This is a rear-cut machine. The rake is driven by square-linked chain-gear, with self-tightening lever, as shown in the accompanying sketch (Fig. 8, p. 13).

The arrangement for raising the platform and altering the angle of the knife-bar is very ingenious. Two speeds, according to the nature of the crop, can be secured by a reversible pinion. The knife gearing and driver's seat are outside the driving-wheel, and thus to a certain extent the weight is balanced. The platform hinges up for travelling in a compact form. The frame is well braced and very strong.

Harvesters.—I have next to describe the *Harvesters*, a class of machines which are unknown in this country, and which derive additional interest from the fact that they have been used as the basis of the automatic binder. Before describing particular inventions, I may remark that most of these machines agree in their general construction, which is as follows:—A large travelling-wheel, and a platform-wheel in a line, supporting a frame carrying a revolving cloth which travels at right angles to the machine; an elevator which raises the grain over the travelling-wheel and transfers it from the travelling-web to the tying-platform. This elevator is variously contrived. In M'Cormick's machine the grain passes between revolving cloths with cross sections of wood. In other cases it is kept on the elevator by means of spring laths; be this as it may, the object is the same, viz., to deliver the grain in a continuous stream, and in a direction parallel to the line of advance, on to a table, where two or more men stand or sit and make the sheaves; when made, they are either thrown down or placed upon a drop platform, which is actuated by leverage from the driver's foot, so that the requisite number of sheaves for a stook can be dropped together clear of the horses' track. The driver's seat is placed in front of the travelling-wheel and elevator. The reel, which is in a line with the cutter-bar, is capable of being raised or lowered, placed forward or backward, according to the nature of the crop. The arrangement of the crank and pitman is peculiar. The knife is generally driven from the centre by a lever under the platform, as there is no room for the gearing in front. This is a clumsy mechanism, which, however, is rendered necessary from the complication of gearing and the form of the apparatus. It follows as a necessity that the cut should be high, so as to allow free play for the connecting-rod under the table.

I have said that the carrying apparatus usually consists of a travelling-band with cross sections of wood. In Adams and French's machine, made by the Sandwich Manufacturing Company, the corn is forwarded and elevated by vibrating rakes, which have the advantage of greater durability, but the motion is likely to cause loss by shedding in ripe grain. In this machine the knife-gear is in front. The following illustration (Fig. 9) will convey a better idea of the nature of these machines than any description.

Fig. 9.—*View of Adams and French's Harvester at work.*



I think that this description of machine is only available for light crops; that the use of canvases, belts, and rollers is highly objectionable, on account of the tendency of the canvas to stretch and shrink, and of the straw to wind round the rollers, causing friction and delay. The crop must be very light or the progress of the machine very slow, to allow two binders to tie up the grain without great waste. In some of the machines the men were fixed close together, and unavoidably got in each other's way, and the work was far too severe to be pursued for any length of time.

A complete divergence, and, as I think, improvement, from the ordinary type of harvester was shown by George Esterley and Sons, of Manufis, Whitewater, Wisconsin. In this machine canvases, belts, and rollers are dispensed with; we have a 5-foot knife, ordinarily geared, with a concave platform behind it; an ordinary reel, and an extraordinary balanced rake-arm. The corn is laid upon the platform by the reel, and swept up the concave incline by the rake-arm. A section of the upper end of the concave platform is hinged, and can be raised or lowered, the object being to graduate the falling of the grain on to the transverse platform. The rake, after doing its work, that is, after delivering the grain on to the said transverse platform in the same position as it was originally left by the reel, comes forward and folds itself in between the arms of the reel, and this notwithstanding that the latter revolves the more rapidly. This is a very ingenious arrangement, and must be seen in work to be appreciated. The reel can be raised or lowered as required to suit differences in the crop. The most ingenious feature of this machine remains to be described, viz., a collector which works from side to side of the transverse table and collects and brings the grain pressed into a bundle to the workmen seated opposite each other. This is highly ingenious, and is effected with very simple gearing. A cam on the second gearing-wheel on the main axle actuates a sun-and-planet gear, which produces the necessary intermittent motion of the collector. The rakes are driven by a small spur-wheel on the main axle of the driving-wheel. I have attempted to show this by a sketch, Fig. 10, p. 16.*

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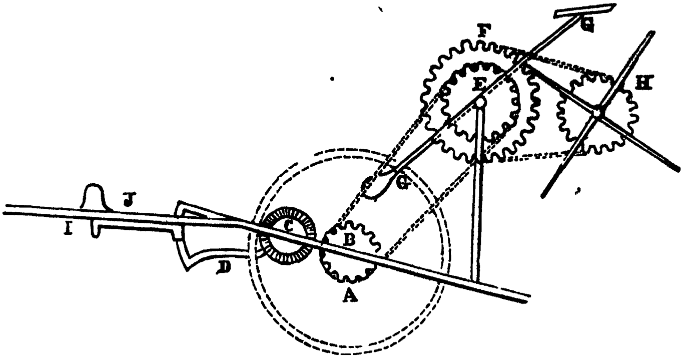
* In this sketch no attempt is made at exact proportions. The concave platform and transverse tying-platform are not accurately shown. The only idea has been to convey some notion of the simplicity of the mechanism by which such important results are obtained.

Fig. 10.—*Diagram of Esterley's Harvester.*

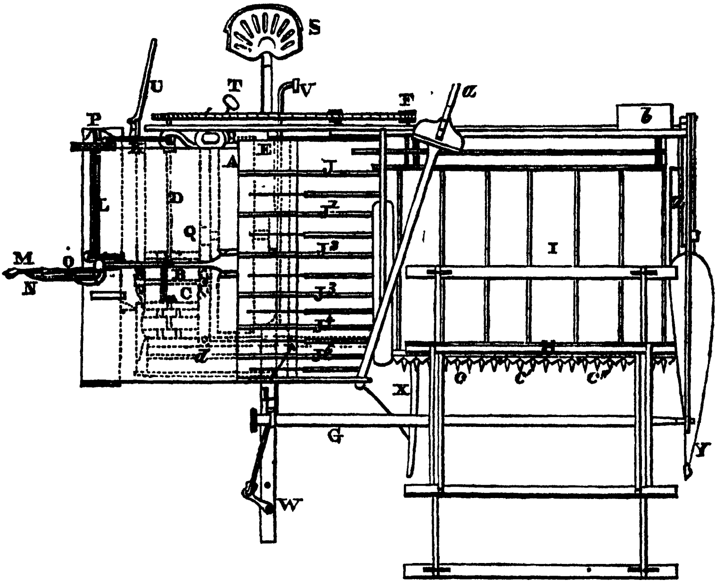


A. Travelling-wheel; shown by dotted line.
B. Spur-wheel, driving rake and reel by chain-gear.
C. Second gearing-wheel in connection with the cam D actuating the collector, of which a side view is seen at J, the end of the collector-board.
E. Sproggle-wheel on rake-spindle, driven by chain-gearing.
F. Second wheel on same shaft, driving reel-shaft.
G. Rake-arm.
H. Small wheel on reel-shaft.
I. Side view of frame.

The sheaves as made, are placed upon a tilting platform, which extends beyond the transverse platform, and is actuated by a lever from the driver's foot. Unfortunately this machine was not taken out for trial, and therefore I only saw it worked by belting; but the motions are so simple and the action so steady, that I formed a very high opinion of its utility. I believe that, by the aid of the collector, two good men, placed at the greatest advantage to make the most of their activity, might tie a light crop as fast as delivered. I think, further, that the Esterley harvester might be converted into an automatic binder, without any serious complication. It has many advantages over the harvesters with canvas belts; the action of the collecting-rake is less violent, and the risk of loss from shedding is reduced. There is a greater margin as to the height of cut, and corn can be cut closer, as there is no canvas box or connecting lever for the knife; generally the mechanism is more simple, and therefore less liable to become deranged. The mechanical assistance of the collector is considerable; the binders, being comfortably placed at opposite ends of the table, have plenty of elbow-room and can work to much greater advantage than when packed close together, and having to take the corn as delivered by the elevator. There was only one form of harvester (not automatic) tried at Schencks.

Sheaf-binding Machines.—The great feature of this department, and indeed of the whole Agricultural Exhibition, was the automatic binders, the realisation of a long-cherished notion on which mechanics have been engaged for years. At present the most successful of these inventions, of which four different kinds were shown in actual work, is probably far from perfect; but just as the first Exhibition of 1851 was memorable for the introduction of a reaping-machine, will this be remembered as the first public occasion on which automatic binders were successfully worked. It is also noteworthy that at the same time that automatic binders were attracting attention at Philadelphia, steam-reaping was attempted in this country with considerable success. I have an idea that the automatic binder might be driven by steam, and that a combination would be very advantageous. In the Western districts, where farming is carried out on a vast scale, the exceeding flatness of the country renders it highly suitable for steam-power, and I look forward to a time not far distant when this mighty force will be employed in agriculture, as it has long been in manufactures. At Philadelphia four different inventions were shown and tested in the field for self-binding, viz., McCormick's, W. A. Wood's, F. L. Osborne's, and D. McPherson's; and in each case wire was the binding material. I am aware that a strong prejudice exists in this country against wire, which I admit to have shared in, previous to personal experience; but which is now entirely removed from my mind. The objections urged against wire are, that being non-elastic, the shrinking of green-cut corn will cause the sheaf to become too loose for convenience; and, however carefully handled, portions of the wire must pass through the threshing-machine, to its risk and the certainty that sooner or later the obnoxious material will be cut up like chaff, and entering the animal system cause death. The wire can be prevented from entering the threshing-machine at all, by the use of a pair of forceps, which, whilst they cut the wire, retain it in their clasp. The man who attends upon the feeder has this work to do; he not only cuts the wire, but takes care that it is removed clear away from the machine. Unfortunately it cannot be used over again; but its sale would pay for a good deal of the cost. Let us hear the opinion of a celebrated manufacturer: "There are now," he says, "over 1000 binders on our pattern at work in the field, the oldest being six years from infancy; during the last four years the prejudice against the wire band has been wearing off, until now very little is said against its use, and nothing said against it by those who have used it. These binders are used by stock-growers in nine cases out of ten. Some of them feel safe in putting the bundles into the threshing-machine with the bands on, and they always come through in one piece the wire breaking nearly opposite the twist. Others, whose fears are not all removed, use such shears as have been alluded to, and are particular to put the wire in a large box; all agree that it is less work to handle bundles for the threshing-machine bound with wire than with straw." With regard to the first objection, as to tightness, the wire, owing to the tension to which it is exposed, and which can be regulated, makes the sheaf closer to start with than is possible with straw; and allowing for considerable contraction, I do not believe the sheaves would become inconveniently loose. It is undoubtedly true that straw contracts longitudinally; but the proportion of such contraction is very small, as compared with the shrinking in bulk. With regard to the cost of the wire, I believe it may be safely estimated at 1*s*. an acre, and something may be calculated for the old wire, which could be worked up again. I have previously stated that in all the automatic binders the form of the machine was similar to the ordinary harvester. The following figure, which represents a plan of W. A. Wood's Harvester and Self-binder combined, will, with the lettered description, give a good general idea of the apparatus and the *modus operandi*.

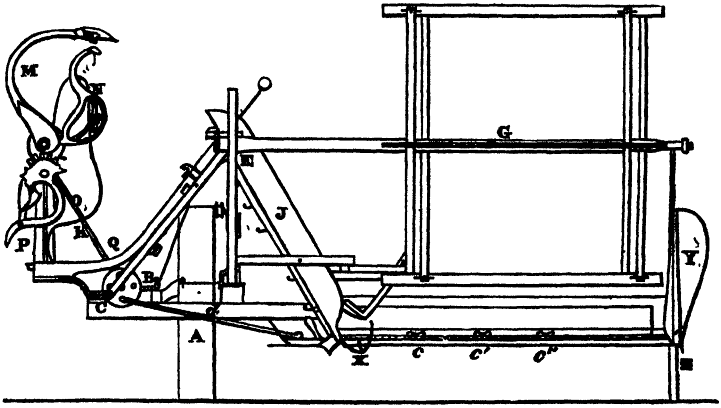
Fig. 11.—*Plan of Walter A. Wood's Harvester and Self-binder combined.*



A.	Driving-wheel, with spur-gear.
B.	Cross-shaft, driven by A.
C.	Crank-shaft, driven by bevel-gear from B.
D.	Elevator driving-shaft, driven like C.
E.	Large elevator roller, driven by chain and chain-wheel from D.
F.	Apron driving-roller, driven same as E.
G.	Reel, driven by chain.
H.	Sickle-bar.
I.	Apron with slats, carries grain towards J^1, &c
J, J^1, &c.	Elevator belts.
K.	Oblique shaft, driven by bevel-gear from D.
L.	Binder-shaft, driven same as K.
M.	Binder-arm.
N.	Compressing arm.
O	Reciprocating arm.
P.	Standard supporting shafts and arms.
Q.	Receptacle for the grain.
R.	Stand for wire-spool.
S.	Seat for driver.
T.	Foot-lever for stopping action of binder.
U.	Lever for altering position of binder.
V	Tilting-lever.
W.	Pole.
X.	Inside divider.
Y.	Outside do.
Z.	Ground-wheel.
a.	Seat standard to attach seat, when binding by hand.
b.	Tool-box.
c c' c''	Fingers.
d.	Pitman.

The driving-wheel of large size is indicated by the dotted lines at A. The first-motion shaft B is driven by spur-gearing; a bevel-wheel on this shaft drives from either side the crank-shaft C, and the elevator driving-shaft D. The two pinions balance each other, and as the binding machinery is driven from D, it will be seen that the arrangements for producing complicated effects are remarkably simple. The rollers which drive the apron and elevator by which the corn is carried from the knife to the tying-apparatus are both driven from the end of the shaft D by chain-gearing. This, again, is well contrived. The apron with wooden slats is shown at I, and the elevator-belts at J J^1 J^2 J^3 J^4 J^5; and this completes the whole of the machinery belonging to the harvester proper. The tying-apparatus can be readily detached, and the machine worked by manual binders; all that is required is to shift the driver's seat from S to *a*. Before I proceed to details, it may facilitate my explanation if I briefly state the plan of working. The corn is delivered in a continuous stream on to the concave table Q. The revolving binder-arm, with the compressing and reciprocating arm, collect the corn into a sheaf, bind it round with wire, twist the same, and cut it off; all this taking place during part of the revolution of the binder-arm. The sheaf is made and thrown off the platform by means of a couple of springs, not shown in the illustration. The ingenious mechanism by which the two wires are twisted and cut off is more easily understood than described. It is effected by the action of two small toothed wheels working in opposite directions. The cutting off is effected when these wheels cease to move forward, the wire coming in contact with a sharp edge.

Fig. 12.—*Front Elevation of Walter A. Wood's Harvester and Self-binder combined.*



A.	Driving-wheel with spur-gear.	M.	Binder-arm.
B.	Cross-shaft.	N.	Compressing arm.
C.	Crank-shaft.	O.	
E.	Large elevator roller.	P.	———
G.	Reel, driven by chain.	Q.	Receptacle for the grain.
J.	Elevator-belts.	Y.	Outside divider.
K.	Oblique shaft.	Z.	Ground-wheel.

Fig. 12 enables me to proceed with my description. The motion for securing the action is derived from the shaft D by bevel gearings driving the shaft K, which again communicates motion to the binder-shaft L. By a crank-gear the binder-arm M is made to revolve. The compressing arm N is so contrived as to ensure the proper amount of pressure on the band. R is the stand for the wire-spool, a variable tension being provided for. The driver, by foot-leverage at T, can stop the binder at any point, and thereby regulate the size of the sheaf if required; for the action is automatic and continuous. The lever U, also within reach, is useful for shifting the position of the binder according to the length of the straw, so as to have the bands in the proper place. V is a tilting-lever for altering the angle of the platform. The reel, which can be raised or lowered, placed forward or backward, according to the nature of the crop, is driven by chain-gear from the hub of driving-wheel. Like all harvesters, it left the stubble rather high, and my impression is that automatic binders in their present form are adapted only for light upstanding crops. During the experiment the wire broke once or twice, but, as a rule, it made capital work, and achieved a decided success. The crop at Schencks was some ten days over-ripe, consequently more corn was knocked out by the action of the elevator than would have been the case if the corn had been in proper condition for cutting.

The next machine I shall endeavour to illustrate and describe is the invention of Daniel McPherson, of Caledonia, New York. This failed under trial, not from defects of principle, but from imperfect construction; indeed there were those who considered that, in better hands, much might be made of it. Fig. 13 is an elevation of the right-hand end of the harvester. The motion is communicated from the main axle of the driving-wheel by bevel gearing to the shaft S, which revolves continuously. The wire-carrier or needle, N, which is best seen in Fig. 15, showing an enlarged reversed drawing of the twister-frame, is attached to the horizontal bar B, to which an up-and-down motion is communicated from the shaft S by means of the pitmen and cranks P and I. The feet of the twister-frame F rest upon journal-bearings on the shaft S, and the upper portion is secured to the bar or beam T of the frame. Between these bearings the mutilated or compound gear-wheel G, which is seen in Figs. 13, 15, 16, and 17, is keyed upon the shaft. I need not go into details in regard to the curious mechanism further than to state that one revolution of the shaft S gives several revolutions to the twister, one-half of a reversed turn, and then an interval of rest. This latter occurs while the needle N is completing its downward stroke, which movement places the second end of the wire across the two sets of jaws, which are seen in Figs. 15 and 16. The tongue b^1, Fig. 16, closes upon and grasps between it and the head *d* both wires, and cuts them off between the grasp. At about the same instant the lower jaw h^1, Fig. 15, is opened, to discharge the cuttings and grasp the end of the wire before the wire-carrier or needle N rises to receive the next sheaf. Fig. 14 shows a rear elevation of the right-hand portion of the reaper-frame with the binding apparatus attached. The collector is composed of two or more arms, C, Figs. 13, 14, and 17. They are fixed to the horizontal shaft S^1, which is driven by the shaft S through S^2, an intermittent rotary motion being given by means of the mutilated gear-wheels G^1 and J, Figs. 13 and 14. At the lower edge of the collector concave C^1, shown in Figs. 13 and 14, is a binding-shelf or apron, M, Fig. 13, sufficiently depressed to allow the beam B to move below the sweep of the revolving arms C, and thus allow them to revolve over the bar; directly after which the latter rises again to its upper or open position, preparatory to receiving the next sheaf from the revolving arms C. A compresser, E, shown in Figs. 13 and 14, with a spindle, K, seen in Figs. 13 and 17, which is attached to the reciprocating bar B, gives the necessary amount of pressure to the needle or sheaf of grain. The wire passes from the reel R, Fig. 14, through loops *l*, *l*, and an eye in the wire-guide h^2, thence down to and through the eye in the needle N, Fig. 15. The reader will understand the operation of the machinery from these details. It depends upon the combined motions produced from the shaft S, by means of two sets of mutilated wheels, which operate on the collectors and the twister at such periods as ensure the col-

Figs. 13–17.—*Illustrations of Macpherson's Binder.*

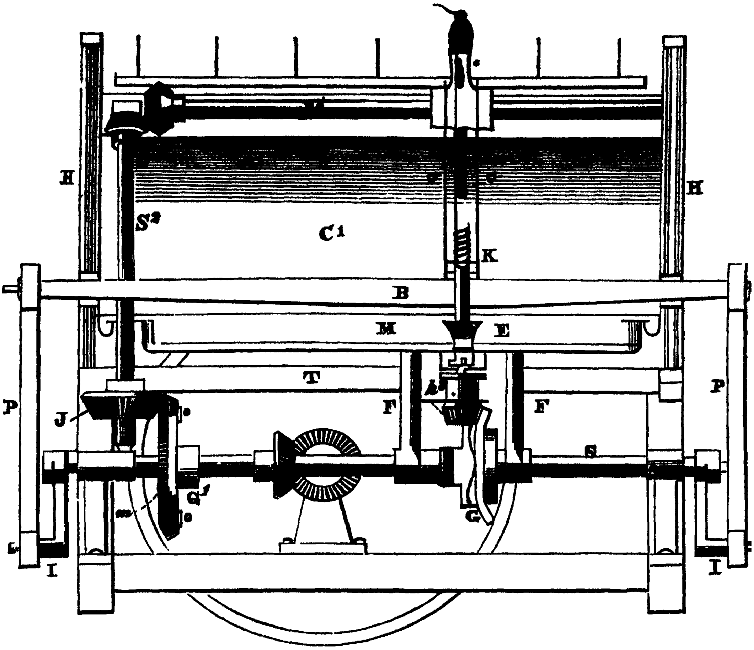


Fig. 13.—Elevation of right-hand End.

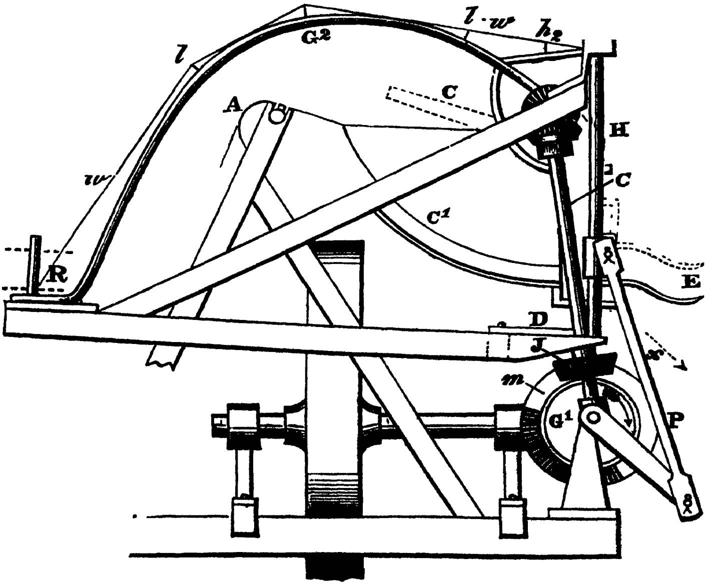


Fig. 14.—Rear Elevation of right-hand portion of Reaper-frame (with Binding Apparatus attached).

Figs. 13–17.—*Illustrations of McPherson's Binder (continued).*

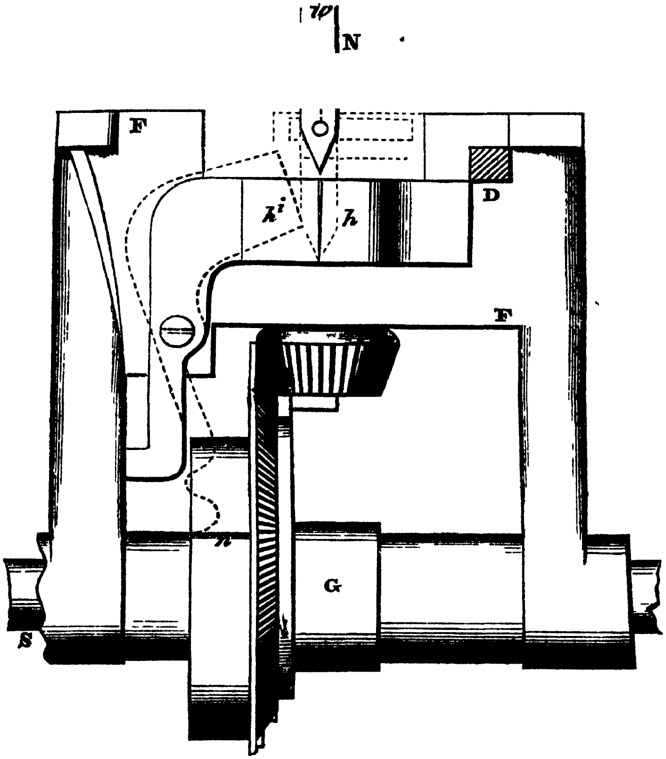


Fig. 15.—Twister-frame, enlarged and reversed.

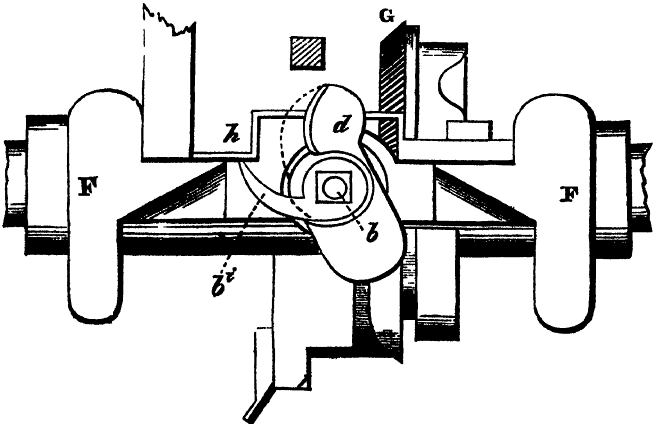
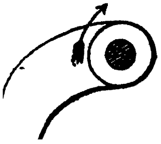


Fig. 16.—Top View of Twister-frame.

lecting of the sheaf at the moment when the needle comes down, and the proper twisting and cutting off of the wire; but, in order to remove any obscurity, I reproduce the designer's words:—"The cut grain is delivered from the elevator A (Fig. 14) into the gaveller concave C^1. When the binder-bar B, to which the wire-carrier or needle is attached, is in its upward position, the wire is stretched from between the lower clamping jaws h and h^1 (Figs. 15 and 16) to the point of said needle or wire-carrier N. The gaveller-arms C are then revolved, taking in what grain may have been deposited in the concave, and forcing it against the wire. The gavel or bundle is thereby carried beyond the vertical line of travel of the wire-carrier N (reeling off the necessary amount of wire to form the band), and, as it descends, the wire is made to encircle the sheaf, and that end or portion of the wire is also delivered to the grasp of the head d and jaw b^1 (Fig. 16), by which they are firmly clamped, cut off, and twisted together. While this is being done, and before the bar B rises, the lower clamping jaw h^1 (Figs. 15 and 16) opens, and discharges the end or cutting just formed, and closing immediately upon the end just presented to its grasp by the last descent of the needle N. The bar B and needle now rise again, and deliver the bundle just bound, and the operation is complete."

***Illustrations of McPherson's Binder* (*continued*).**



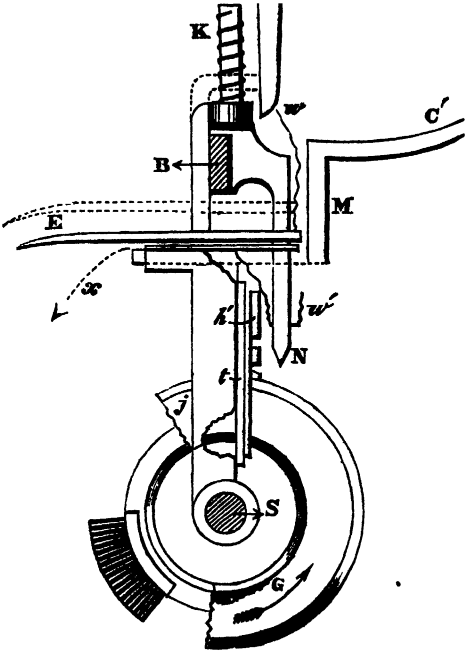


Fig. 17.—Front Sectional Elevation of the Gavelled Binder-needle and Twister-wheel.

McCormick's Automatic Binder combines some novel and ingenious features, which may be briefly described. It is quite impossible to attempt a mechanical account, which would necessitate a series of illustrations quite beyond my limits. The chief peculiarity of the invention consists in the mountings of the binding-apparatus upon a traversing carriage so that the binding-arm moves up to that part of the table which receives the grain from the elevating apron,

strikes into the inflowing grain, separating the portion to be bound, encircles it with wire, which, owing to the application of a spring arrangement, is endowed with the requisite degree of tension to secure a closely-bound sheaf; twists the wire and cuts it off during the backward movement, and finally discharges the sheaf.

The driver adjusts the binding mechanism so as always to bind the bundle midway of the length of the grain, by means of a lever handle, mounted on a small lantern-wheel working in a rack and connected, by flexible links passing over pulleys, with the binding mechanism, which moves freely backwards and forwards in a direction parallel with the length of the grain. The subjoined illustrations (Figs. 18 and 19) show the front and rear elevation of the binding-apparatus. C is the driving-shaft, on which is a double sproggle-wheel which gears into corresponding wheels on which the driving-chain I passes, as well as over corresponding wheels on the opposite end of the gear-frame J. The arrow shows the direction in which the chain-gear travels. This chain carries a slotted link, *l*, connected with a shaft, L, and imparts the reciprocating motion to the binding-arm necessary for the various motions. I will endeavour to describe the mechanism. N, N^1 are pitmen pivoted on the crank L^1 of the shaft L, attached respectively to the cranks *o p* of two rocking-shafts, concentric with each other and mounted in bearings in an overhanging support of the binding-frame. The crank which operates the compressor is adjustable laterally by the slotted rack and set screw, and its throw is thus regulated. The inner rocking-shaft consists of a steel rod carrying at its forward end a crank arm, O^1, working in a slot in a vibrating compressor, R, pivoted at *r*, so as to give the compressor a movement eccentric to that of its driving-shaft. This shaft, owing to this construction, allows the compressing arm and its crank to yield under the strain of binding the sheaf. The binding-arm S is slotted lengthwise to receive the supplementary arm T, pivoted at *t*, and is vibrated at proper intervals. Two wires are used in binding, and consequently two twists are formed. The wire from the upper reel *w* passes through a tubular spindle, *x*, with a tension spring, thence over a pulley, *m*, on the arm M^2, thence over the

Fig. 18.—*Front Elevation of McCormick's Grain Binder.*

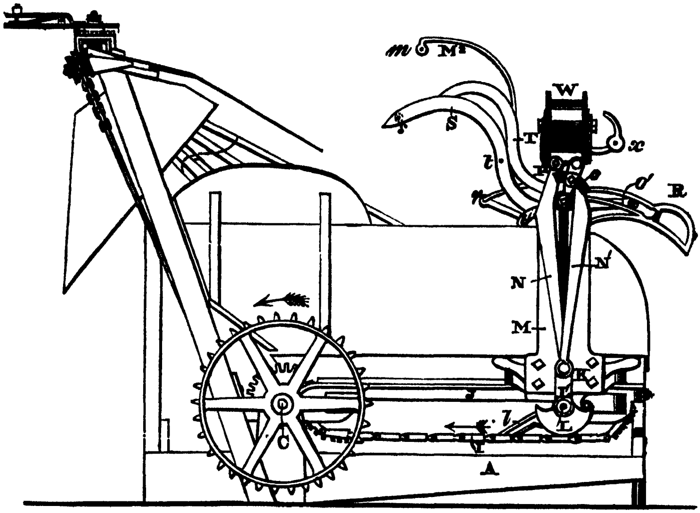
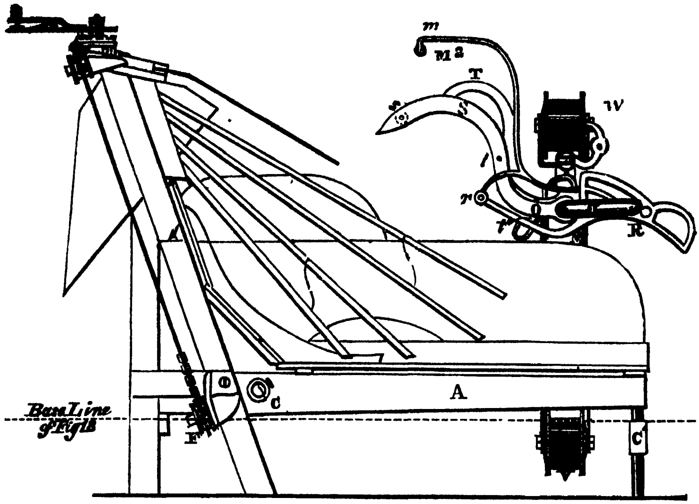


Fig. 19.—*Rear Elevation of McCormick's Grain Binder.*



pulley *s*, where it is united to the lower wire. The lower wire passes from the spool V, a positive feed being employed. This arrangement is very clever. The wire is only fed when a bundle is bound. We will suppose that the two wires are connected, then the binding-carriage is ready to move forward with its binding-arm uplifted as is seen in the figure, in readiness to encircle a bundle lying upon the platform. In the absence of any grain to be bound, the binding mechanism would go through its motions and return to its starting-point, but no wire would be fed from the lower spool. This machine was tried at Schencks Station on an average crop of wheat, and made very good work. The wire broke once or twice, but such accidents were readily repaired. I much regret that I am not able to give a drawing and detailed description of the binder shown by F. L. Osborne and Co., inasmuch as this machine made decidedly the best work at the trial, cutting a considerable area without the wire breaking, or a stop of any kind. The apparatus consists of an ordinary harvester frame, with linen travelling-belt, and elevator furnished with teeth. The peculiarity consists in the binding-arm being placed on the near side instead of the end of the binding-platform, and having a swan-neck motion, so that, drawing the wire from the spool, it twists it round the grain, and forces the straw together whilst the tying takes place underneath. The sheaf is pushed off by the needle as it rises to repeat the motion. The mechanism by which this elegant movement is obtained is both simple and ingenious.

MOWING-MACHINES.

Before describing some of the peculiarities in mowing-machines, it may be as well to explain that the trials which were organised, and which included all kinds of harvesting machinery, threshers, winnowers, and portable engines, were not, as originally intended, of a competitive character. This part of the programme was wisely abandoned by the Centennial Commission at the request of the leading makers. Competitive trials to be valuable must be exhaustive. For carrying them out, a crop varied as to character, difficult to cut, machinery of a special character for testing draft, a large area of land, and, above all, plenty of time and opportunity for a thorough test, are essential conditions. None of these were present. Moreover, one of the conditions of competition fully resolved on was that only one prize should be awarded in each class, and that, however meritorious less successful machines might prove, they must remain unnoticed and unrewarded. At Eddington, the scene of the mowing-trials, the crop of seeds (Timothy and Clover) was so light and open in the bottom that it afforded, as it stood, no criterion whatever as to the ability of the machines to deal with ordinary crops. Every one of the 20 machines that were tried made creditable work; and it was only when the mowers followed a heavy roller that decided differences of efficiency were visible. This action, on the rolled grass, was the best test that could be applied, but it hardly represented natural conditions. I leave the reader to imagine what would have been the position of the Jury if their verdict had depended upon the results of such a trial—due quite as much to the jockey as the horse. Through the courtesy of an exhibitor, and not by any foresight of the Commission, a dynamometer was applied, and I can therefore give the comparative draft of 20 machines. I believe that this alteration of programme gave general satisfaction. The exhibitors had an opportunity of showing their machines, the public could, if they took the trouble, judge for themselves as to comparative merit, and the Judges made their notes and formed conclusions of great value in their selections for medals.

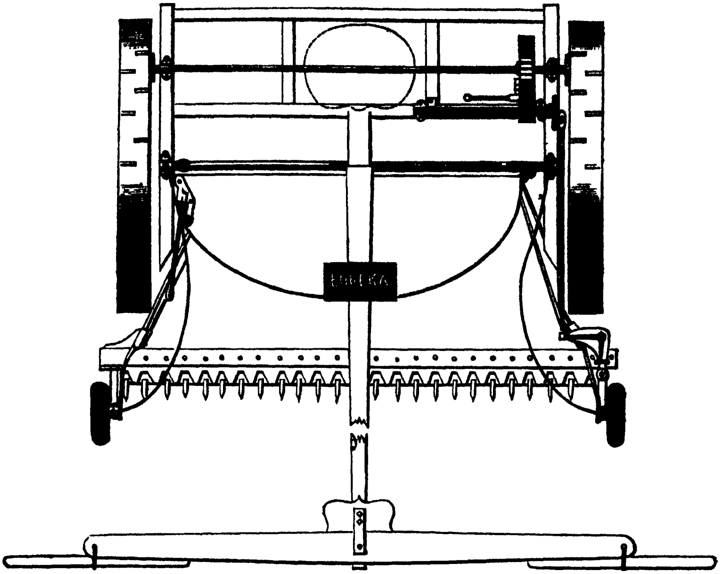
The Table given on page 27 is interesting, as it shows a greater difference than I should have thought possible. Thus, to compare two extreme cases, the Eureka Machine, cutting ¼ in. higher it is true, took a trifle over half the power, per square foot of grass cut, required to drive one of F. L. Osborne's machines. The difference in horse-power, and the saving that must be effected by using the lighter-draft machine, may easily be imagined.

This *Eureka Machine*, made by the *Towanda Eureka Mower Company* of Towanda, Pa., is a complete departure from ordinary principles, the great feature being direct draft. I believe that it was shown in this country some years since, but has been recently much improved, and is now commanding much attention in the States. An idea of the form of the machine and *modus operandi* will be gathered from the following illustration (Fig. 20, p. 28), which gives an accurate plan. The knife, which in the machine exhibited at Philadelphia was 6 feet long, works in front of the wheels, being driven by spur-gearing, long pitman at right angles, with knife and bell-crank from the left-hand driving-wheel. It is attached to the frame by jointed arms, so contrived that the angles of the fingers can be altered according to the nature of the crop. The pole is directly in the centre between the driving-wheels, which are of large diameter, viz. 42 inches. The driver's seat is imme-

TABLE I.—RESULTS OF DYNAMOMETER TRIALS OF MOWING-MACHINES.

Number.	NAME OF EXHIBITOR.	Distance Run.	Position of Knife.	Height of Cut.	Width of Cut.		Total Draft.	Draft per Square Foot of Grass Cut.
				Inch.	Ft.	In.	lbs.	
1	Warder, Mitchell, and Co.	100 Feet.	Rear cut ..	1½	3	9¾	131	·343
2	Russell and Co. (Peerless)	,,	,,	1½	4	4	157	·388
3	Rochester Agricultural Works	,,	,,	1¼	4	6¾	206	·392
4	C. W. Otis (Haymaker)	,,	Front cut ..	1½	4	3	165	·388
5	Eureka Company	,,	,,	1¾	5	11½	172	·288
6	Adriance, Platt, and Co.	,,	,,	1½	4	3	200	·470
7	C. Aultman and Co.	,,	,,	1½	4	4½	178	·406
8	W. A. Wood	,,	,,	1½	4	4	222⅕	·513
9	Bradley Manufacturing Co	,,	,,	1½	4	3	182½	·429
10	Johnstone and Co.	,,	Rear cut ..	1½	4	2½	204	·484
11	W. Farr Goodwin	,,	Front cut ..	1½	4	3	186	437
12	Osborne and Co.	,,	Rear cut ..	1½	4	7¼	260	·564
13	Screw-Mower Company	,,	Front cut ..	1½	4	2¾	235	·555
14	Keystone Manufacturing Company	,,	Rear cut ..	1½	4	5¾	228	·509
15	McCormick	,,	,,	1½	4	0¾	190	·467
16	Grigg and Co.	,,	Front cut ..	1⅝	4	7	205	·446
17	Osborne and Co.	,,	,,	1½	4	3¾	220	·510
18	Osborne and Co.	,,	,,	1½	4	11¾	238	·470
19	Hubbard (Meadow Lark)	,,	Rear cut ..	1½	4	0	140	·350
20	Aultman, Miller, and Co.	,,	,,	1½	4	0	171	·427

Fig. 20.—*Plan of Towanda Eureka Mower.*

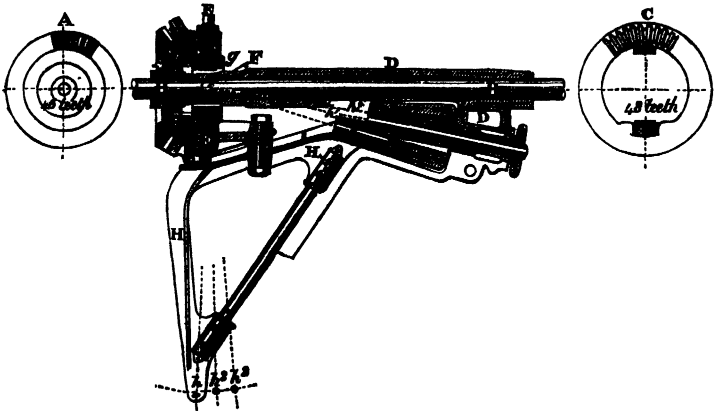


diately behind the pole, with a spacious foot-board. The horses are yoked so wide apart, by means of a long neck-yoke, that whilst the near-horse travels close to the standing grass on the space cleared by the track-board, the off-horse walks in the standing grass outside the knife. This is a point of great importance; had the knife followed the grass trodden down by the horses' feet, the cutting would be irregular, but as it meets the down-trodden grass on the return journey, there is not any perceptible difference, and no work was more regular, although the cutting was for some reason a quarter of an inch higher than the ordinary machines. One great advantage of direct draft is that the machine can return along a parallel line and therefore meets the down-trodden grass, and the operator can deal with a laid crop in the direction which secures the best result. For instance, it often happens that a heavy crop becomes laid in one particular direction: ordinary machines, cutting all round the field, must either go empty in one direction, or else follow the laid crop on one side, and inevitably make rough work; for such cases, by no means unfrequent, the Eureka is peculiarly suitable, because the whole crop can be cut at right angles to the direction in which it is laid. Another minor advantage is that it clears the ground straight before it, facilitating later operations. The fact that the near-horse walks clear of the cut grass is a point that must not be lost sight of, especially when considered in reference to the peculiar manner in which the grass is left by the double track-board, viz., in a beautifully light, open swathe, very favourable for curing. Indeed, with wind and sun, no tedding is necessary, and the work of hay-making is materially lessened. I understand that three sizes of machines are made, the largest having an 8-foot knife. I think that, for general purposes, the medium size is best. Two ordinary farm-horses walked away with great ease, a fact that is proved by the excellent records on the dynamometer. The machine is strongly made, is very simple in construction, and I see no reason why it should not be durable. The action of the clearers is peculiarly valuable in the case of clover-crops, where the tedder is likely to do mischief by breaking the leaves.

The next machine that claims attention is "*The Haymaker*" *Mower*, made by *Otis Brothers and Co.*, of New York, which, in its simplicity and efficiency, appears a highly valuable invention. The motion is transmitted from the travelling-wheels to the knife by a single pair of bevel-wheels, and much friction is saved (Fig. 21).

The driving-wheel A is keyed to the main axle B, and revolves with it. The oscillating internal bevel-wheel C is pivoted by a gimball-joint to the sheaf or frame D, in such a manner that it can swing round the point F, which is the apex of the gear-cone of the two bevel-wheels A and C. Two steel pins, E E, form the joint between the gimball-ring *g* and the wheel C, and two other steel pins at right angles with the pins E E form the joint between the frame and the gimball-joint ring.

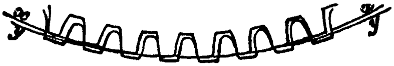
Fig. 21.—*Gearing of Otis Bros. and Co.'s Haymaker Mowing-Machine.*



The internal bevel-wheel C thus secured, serves as one arm of the lever which operates the knife, while the triangular malleable frame H furnishes the other end of the lever, to which the link which operates the knife-head is attached at *h*, whilst the other end of h^1 furnishes a bearing for the guide-crank I. This guide-crank is shifted to one side of the main shaft, and the centre line of the shaft, as well as the centre line of the crank-pin and the centre line of the four joint pins radiate from the point F, which is, as before stated, the apex of the cone of the two bevel-wheels. The action of this device is as follows:—

When the gear A revolves with the main axle, it causes the bevel-wheel C to swing on the centre of the gimball-joint, whilst the guide-crank I is turned in the opposite direction to the main shaft. Whenever the guide-crank I has made one revolution, C has been in contact with all the teeth of A; and as C has 48, and A only 46, it has passed over two more teeth than A; and when the revolutions of the guide-crank has gone on 23 times, we shall find the same teeth of both wheels in contact again. We have thus, for every revolution of the gear A, 23 revolutions of the guide-crank; and during this one revolution 1048 teeth have been in contact. But although the guide-crank makes a rotary motion, the oscillating-wheel makes a vibrating motion on the gimball-joint pin, and the arm H, which is in reality a part of the wheel C, makes at the point *h* a reciprocating motion from *h* to h^2, which corresponds with the angle formed by the crank-pin when in the position shown in the drawing, and the position of the crank-pin when the guide-crank has made half a revolution. We have thus a double lever, which is pivoted to the frame at F, to which the knife is attached at *h*, while the gear C is the other end of the lever. When the teeth of the two gears A and C are in contact, as shown in the drawing, the point *h* is at a standstill, and the knife is at one extremity of its stroke. But the forward motion of A will bring all the teeth of C successively in contact; and when the guide-crank has made one-quarter of a revolution, the point *h* has reached the position h^3; and when half a revolution has been made by the crank, and the centre of the crank-pin is in the position shown by the line at h^4, the arm has reached the point h^2, and the knife-bar has made a stroke in one direction. The next half of the revolution will bring the teeth of the gear C in contact with the gear A on the opposite side; and this causes the arm to move back to its original position, and the cutter-bar has completed one motion. The rotary motion of the gear-wheel A is thus converted into a reciprocating motion in the most direct manner, and without any further loss by friction than what is due to the vibration of the wheel C on the gimball-joint. The guide-crank performs the function of a balance-wheel also, and the motion of the point *h* is identical with the motion produced by an ordinary crank and pitman. To produce one vibration of the cutter-bar the 48 teeth of the oscillating gear come in contact with the teeth of the driving gear, and of these teeth at least six are in contact all the time. Thus the wear is evenly distributed; the rapid serpentine vibrations of the oscillating gear are very pretty.

Fig. 22.—*Teeth of Otis Bros. and Co.'s Haymaker Mowing-Machine.*



In Fig. 22 the teeth are shown: *x x* represents the pitch-line of the driving-gear A, whilst *y y* represents the pitch-line of the wheel C; and the large number of teeth in contact all the time constitutes a strong point of superiority in this machine. The advantages claimed for this invention over ordinary gearings are as follows:—The rotary motion of the driving-wheel is converted into a reciprocating motion, and transmitted to the cutter-bar by one gear-wheel, without the use of two, and sometimes three, intermediate shafts. Forty-eight teeth are successively in contact to produce one vibration of the cutter-bar, whilst in the ordinary gear only $\frac{1}{23}$ of the number of teeth of the driving-gear can be used for each vibration. Using the whole periphery of the driving-wheel for each vibration, and having so large a number of teeth in contact at once, allows of the gear being reduced to one-third the ordinary size, with three times the working surface. The cutter-bar of the "Haymaker" is attached to the arm of a lever pivoted to the frame, 24 inches long, whilst the driving-gear A operates upon an arm of the same lever, which is 3½ inches long. This secures a very powerful and direct motion, and all who saw this elegant device, either rotating in the hall or working in the field, were impressed with its simplicity and efficiency. The cutter-bar was rigid, and could not be tilted; hence the work after the roller was bad. But this is a detail that can be easily altered, and has nothing to do with the principle by which the power is communicated. There is only one rotating bearing besides the axle, being that of a small fly-wheel which tends to give regularity and steadiness of motion. The machine is perfectly silent in running; and, as will be seen by reference to the Table, the draft was very reasonable. I was very favourably impressed with this machine.

As I am describing novelties, it will not be out of place to allude briefly to two inventions of *Mr. W. Farr Goodwin's*, which were subjected to trial, viz., the machine shown by the *Screw-Mower Company*, and a more modern arrangement, known as the *Reciprocating Screw-Mower*, manufactured by the National Ironworks, New Brunswick, N.J. With regard to the former, it is sufficient to say that the gear comprises a large gun-metal screw-wheel on the main axle, actuating a worm on the crank-shaft. The wheel works in an oil-box, and this is necessary to prevent friction. The action is very direct, but the oil is a fatal objection; farmers are too careless for such an arrangement. Either the oil would be altogether neglected, or left in the receptacle to solidify and dry up. Moreover, when tried under the most favourable conditions, the draft was by no means light. The *Reciprocating Screw-Mower* has more merit, and is a striking departure from ordinary patterns. In this machine there is neither gear nor cog-wheel, crank nor revolving jernal, except the main axle. The whole weight of the machine is supported by the two driving-wheels, and the entire weight is made use of to give motion to the knives. The driving-wheels are arranged to work either together or independently of each other, which allows the knives to work whilst the machine is making short turns, either right or left. The facilities thus secured were shown by the exhibitor himself, who cut out pieces of grass with ease. The power obtained from the forward motion of the wheel is imparted to the shaft from the rim of the wheels by means of arms and notched teeth on the rim of the wheel. In this way the knife is very directly set in motion, and this was exemplified by placing a piece of wood between the blades, and cutting it in two by revolving the wheel without the necessity of gathering power by backing. It is probable, though the experiment was not tried, that no ordinarily geared machine would have done this. The notched arms can be readily thrown in and out of gear. It is a fore-cut machine; the driver's seat, being placed behind the axle, balances the weight on the horses' necks. The cutter-bar is jointed to the frame; two levers control the working of the machine. One of them raises or lowers the cutter-bar, and also swings the frame and cutting-apparatus clear of the ground: the frame is strong, and simple in construction. The mechanical principle—which is that of the bolt-and-nut—was so well described by Mr. William E. Kelly, in a paper read before the Middlesex, U.S., Farmers' Club, that I reproduce a portion of his remarks.

Figs. 23-27.—*W. F. Goodwin's Reciprocating Screw-Mower.*

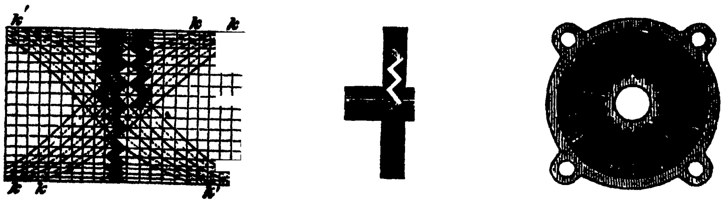


Fig. 23. Fig. 24. Fig. 25.

"The pattern is made with a cylinder of wood 8-in. diameter, which is laid out with 19 right and 19 left-hand threads around its circumference. These threads cross each other, and form 19 points of intersection; by following the right and left hand threads from each of these points we get a line of intersection. If we should pass a plane through each line of intersection perpendicular to the axis of the cylinder, we should virtually cut the cylinder into two pieces, and the section would present 19 corrugations or V-shaped grooves, and corresponding projections radiating from the centre of the points, where the right and left hand threads intersect. Fig. 24 shows centre or bolt section. A section of the nut is made in the same manner, and of course corresponds exactly with the section of the bolt. Fig. 25 gives exterior view of one of the nut sections. The section made from the bolt has a sleeve cast

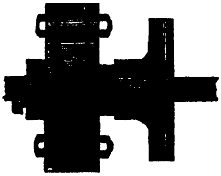


Fig. 26.

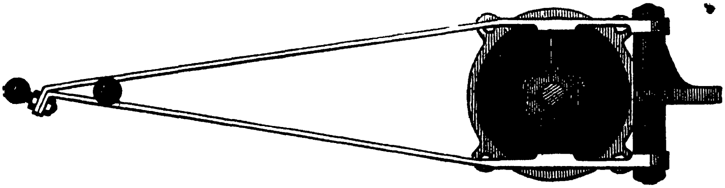


Fig. 27.

on one side of it. This sleeve fits loosely around the axle, and serves to transmit motion from the inside of the nut to the lever. The sections being all alike, the bolt section is fitted in between the two nut sections, in the same manner as the bolt is fitted to the ordinary nut in a common jack-screw. One section of the nut has a hub, by which it is fastened to the main axle, and rotates with it; the other section of the nut is on the opposite side of the bolt section, and rotates with the first-mentioned nut section, being fastened to it by means of a rim, or band and bolt. Fig. 26 shows the movement, crosshead, and part of the shaft connected together, with a portion of the ring of movement cut away, showing internal construction. As before mentioned, the bolt section is placed between the two nut sections, and enclosed in a cylindrical box, formed by the two nut sections, and the band joining them together. The hub or sleeve of the bolt section passes through an opening in one of the nut sections, and is fastened to a lever. Fig. 27 shows crosshead, standard or pivot, and vibrating lever with buffer and joint, to which the knife is connected. The motion of the bolt section is therefore communicated to the lever, and through it conveyed to the end of the sickle or knife. It is obvious that by this combination of the right and left hand screws into one, a reciprocation of the internal section or bolt is obtained by the continuous rotation in one direction of the two outer sections or nuts, provided the bolt is secured from revolving, but still permitted to vibrate in line with the axis of the nut. The axle is secured from moving in the direction of its axis by flanges or collars bearing against the framing." I trust that this description, with the assistance of the illustrations, will familiarise my readers with this highly ingenious mechanism. Mr. Goodwin claims that this is the lightest-draft mower made; and in support of this states that, with a full-sized machine, he has operated the movements from the driving-wheels to their connection with the cutter-bar (when the knife was detached) by 1 lb. weight applied to the rim of the driving-wheel, the latter of course being raised clear of the ground; also that with the knife in, the same result has been accomplished by a weight of 3½ to 4 lbs. Of course this does not prove that the power is as economically applied when work is being done. The following details as to leverage, &c., will be interesting:—By reference to Fig. 27 it will be seen that the ends of the crosshead are turned cylindrically, and are really used as a sort of jernal-bearing, to which the lever is attached, and by which it is operated. The fulcrum of the lever is attached to the main frame at a point 5 inches behind the centre of the axle. The lever is 30 inches long, and the power being applied between the fulcrum and the point of resistance, at a distance of 25 inches from the resistance, and 5 inches from the fulcrum, we have a leverage of five to one. A movement of one half inch at the point where the power is applied, gives a movement of 3 inches at the point of resistance; in other words, the knife travels six times the distance that the bolt section' moves. Supposing the movement to be made up of 23 right- and 23 left-hand throws, we have 46 cuts of the knife for every revolution of the driving-wheels, a speed which certainly ought to be sufficient, seeing that it is seldom exceeded. By reference to the Dynamometer Tables, it will be seen that this machine, No. 11 on the list, occupied an intermediate position as to draft; nine being lighter, and ten heavier, by no means bearing out the inventor's statement as to extraordinary lightness of draft. And the appearance of the horses under work confirmed the reading of the dynamometer; they appeared to be doing harder work than the team that drew the 6-ft. Eureka machine. Practical experience would alone justify a decided opinion as to merit: of the ingenuity of the inventor in thus converting rotatory into a reciprocating motion, without the aid of gear-wheels, shafts, cranks, &c., there can be no question.

I shall next notice a novelty in gearing, shown by *J. F. Seiberling*, of Akron, Ohio, in the *Empire Mower*. The gearing, which is on the main axle, midway between the driving-wheels, and nicely covered in a small watch-shaped case, comprises a spur-wheel and the pinion, each containing two sets of teeth, alternately and intermittingly arranged, the object being to secure continuous pressure, and reduce leverage and friction. This mower was not brought to trial; it was very quiet when running empty. There being only two wheels and two pinions, it ought to work well. There are some other commendable features, to be shortly noticed. The crank-shaft box is made of bell-metal, in a thimble form; slit through on the upper side, so that the wear can be readily taken up by the pressure of a set screw. The pitman-box is on the same principle. The frame is cast in one piece. The finger-bar is connected to the main frame by a double-jointed coupling; and, lastly, the cost is reasonable.

Forsyth and Co., Dundas, Ontario, have an original arrangement in their *Planet Mower and Reaper*, which deserves notice. This consists in driving the bevel-gear, which actuates the crank-shaft, by three intermediate wheels acting between the driving-wheel and pinion. By this arrangement two shafts only are required. One argument for this design is, that the pressure being at three opposite points, the strain is always to the centre. The intermediate wheels are easily thrown out of gear, so that, when not working, only the main shaft revolves. They run loose. The studs are cast on the stud-plate, and the wheels slipped on. This machine was not brought to trial, and I therefore give no opinion as to its general utility.

Warder, Mitchell and Co., who make from the same pattern as the Champion Machine Company and Messrs. Whitely, Fassler and Kelly, showed a small mower which made excellent work, and gave a good account of itself when tested as to draft. The knife is behind the wheels. The height of cut and the pitch of the knives, adjusted by double leverage, which can be brought into play whilst the machine is in motion. The gearing is well covered. The main axle does not revolve. The power is taken from both wheels; the frame is of wrought iron, and strongly made. Short bearings of the wheel-axles; the crank-shaft is of cast steel, with a bearing the whole length, and an oil-chamber in the centre. The axle is of cold rolled iron. The nut of pitman holder, furnished with a ratchet and spring catch, works in a ball and socket with large bearings. The wear is taken up by a screw; at the other end a complete ball and socket. The fingers are forged solid, and the slot is cut out by a circular saw, sharpened and case-hardened. No steel plating is used. Width of knife, 4 feet 6 inches; high speed of knife, 96 vibrations for each revolution of a driving-wheel 32 inches diameter. It is stated that the three firms making the Champion machines—reapers, mowers, and combined machines—have capabilities of producing 30,000 separate machines per annum.

I have next to notice the "*Peerless*" *Mower*, shown by *C. Russell and Co.*, of Canton, Ohio, which did superior work and consumed a reasonable amount of power. This is a well-made, compact machine. The travelling-wheels are free from gearing, the main axle being made to revolve by ratchets and pawls at the hubs, so that both wheels are drivers. The gearing is simple, comprising a set of spur and bevel wheels. The spur-pinion is attached to a counter shaft supported by boxes bolted to the main frame, an arrangement which secures solidity and tends to prevent the cogs being thrown off their pitch-line. The bevel-gear is also attached to the frame. This is a strong and simple arrangement. The frame is of cast iron, strong and rigid. The jernal-boxes are lined with anti-friction metal, and so made that wear can be taken up. The knife-bar is attached by a pivoted connection, allowing of freedom, behind the travelling-wheels; a tilting lever and link to the front of the drag-bar gives facilities for the necessary adjustments. Adjustable shoes at each end of the bar regulate the cut. The guards are of malleable iron, steel-plated. The connections of the knife and pitman are both of steel. At the opposite end of the pitman-rod is a spherical box fitted to a tempered steel pin in the crank-wheel. The seat can be shifted backwards or forwards, according to the weight of the driver. The cap or cover to the gearing can be easily raised, giving access to the parts for oiling, &c. I have said that this machine is a rear-cut, in common with many of those exhibited. There are arguments for and against this arrangement. No doubt the most perfect form is when the knife is in a line with the main axle; but this is impracticable on account of the pitman-rod, except when a short rod is used. The chief argument for a rear over a front cut is that it is safer both for man and horses. The driver may, in case of obstructions, have an opportunity of seeing them in time to stop the machine. Should he be thrown, it is possible that he might be able to get clear of the knife,—at any rate, he has more opportunity of doing so; but principally is the rear-cut safer for the horses, both in working and travelling. A rear-cut machine can be more conveniently handled at the corners of the crop, less backing being necessary.

As a light-running, well-contrived machine, I notice the *Hubbard Meadow Lark*, which, in general construction, is not unlike the Peerless. It is a rear-cut machine, with the gearing on the main axle well boxed off. The attachment of the bar and the leverage for raising the same or altering the pitch of the teeth are convenient. It will be seen by reference to the Table that this mower was only exceeded by two machines as regards draft; but it is right to state that the test was applied to this and the machine of Aultman, Miller, and Co., on different ground and at a different time; hence the conditions were not identical, and therefore the results are hardly comparable. I believe the machine to be a light runner, and a really well-made, serviceable implement.

The *Harrison Manufactory Co.*, Lansing, Michigan, exhibited their patent elastic-rubber buffers, which, placed on each side of the pitman-wrist, where it is connected with the knife-bar, prevents friction and undue wear. The knife-head is made of malleable iron, and consists of a cylinder 3 inches long and 1½-inch inside diameter; the heads of this cylinder are set in with a strong screw-thread, and are three-eighths of an inch in thickness; an oblong opening in the side of the cylinder permits the introduction of the pitman-wrist. Around this pitman-wrist, when inserted, are two brass bearings; between the bearings and the screw-heads are rubber buffers, seven-eighths of an inch in thickness, and filling the cylinder.

The object of the rubber buffers is to prevent the shock which the knife receives by striking on dead or unelastic metal. They also act and re-act on each other, and thus give force to the knife. Another point of merit is that no oil is required and that noise is avoided.

HAY-LOADERS.

An important addition to the mechanical contrivances already in use for the harvesting of hay is *Foust's Hayloader*, manufactured by Stratton and Cullum, Meadville, Pa. This novelty was subjected to a rather severe trial, which was perfectly successful; indeed, I have seldom met with a machine that so entirely came up to expectation and description as this. Like most successful inventions, it is very simple, comprising a revolving barrel, with teeth somewhat curved at the points. The English reader can best realise the form of the machine by imagining a haymaker with backward action, the hay carried round by the tines being placed upon an elevator made up of cross laths and longitudinal wires. The front portion of the machine is supported on wooden tressels, but only whilst being moved. The following drawings give a good idea of the construction and utility of the machine.

Fig. 28.—*View of Foust's Hay-Loader.*

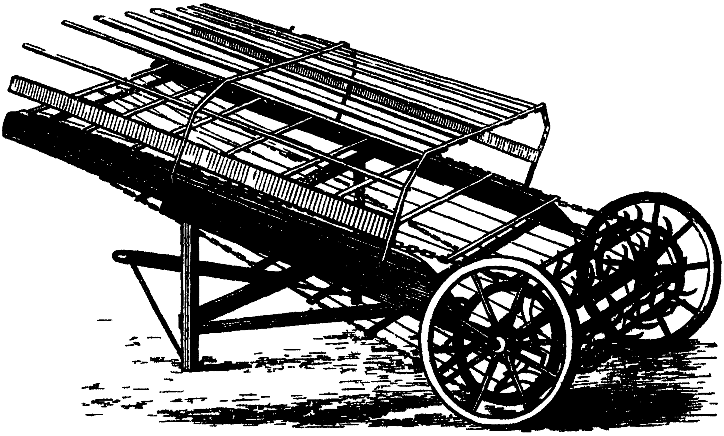


Fig. 29.—*Foust's Hay-Loader in operation.*

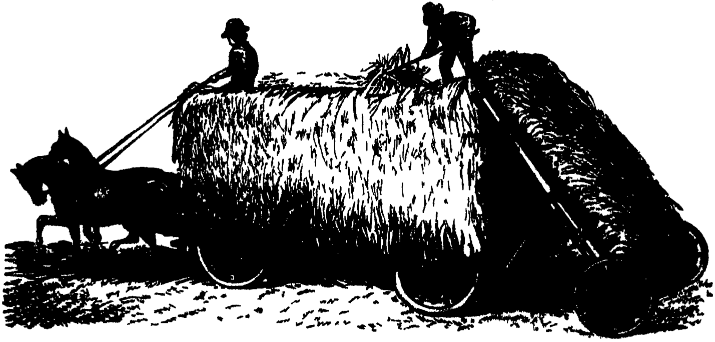
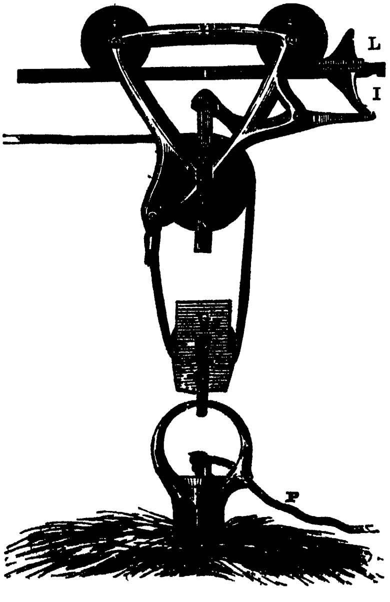


Fig. 28 shows it detached. Fig. 29 represents the connection of the loader with the tail of the waggon. Nothing can be simpler, and, provided the hay is left in windrow, nothing more successful. So clean is the picking up when the surface is tolerably level, that I have no doubt it might be used when the grass has not been touched. It is very light, and does not seriously add to the draft of the waggon. The connection is instantly made, and as quickly unmade. When the hay is carefully prepared in windrows, I have no hesitation in saying that the loader does the work of four pitchers. I arrived at this conclusion by watching the action of two men on the waggon. They received the hay from the elevator, and were fully occupied in placing it on the waggon. The hay is taken up from the ground more closely than is possible with the fork. The elevator is driven by pitch-chain gearing from the circumference of the barrel, and travels much faster than the collectors; hence there is no fear of clogging. A wind-guard, shown in Fig. 28, secures efficiency in windy weather. The machine weighs 500 lbs., and costs 85 dollars retail. The horses attached to the waggon may be yoked wide enough to walk on each side of the windrow.

With such expeditious means of loading, it is equally important that the hay should be as rapidly unloaded; and this is effected by means of the horse hay-forks and conveyors, of which several different forms were shown at Philadelphia. Such appliances are specially suitable for those who, as is generally the case throughout the Eastern States, harvest the hay in a barn; where, by the way, it is said to heat less than in stack, probably because it is less exposed to atmospheric influences. An iron rod or wooden beam is hung below the line of the ridge, extending sufficiently beyond the building to receive the load. By means of pulleys and ropes properly applied, a horse lifts the loaded fork to the conveyor, and moves the latter to any required portion of the building. The operator then draws a string, which acts on the sustaining arms which have upheld the hay, and the load falls.

Fig 30.—*Fitzhugh's Conveyor.*



I shall first illustrate the apparatus shown by *J. R. Fitzhugh*, Indiana, Pa. The fork in this case comprises a single standard with double arms. The plan of operating is to draw up the arms, which are hidden in the sides of the standard, then to force it into the load as far as practicable, and cause the arms to stand out. A large bulk of hay is held together, and can be raised and delivered by the action of the pulley-horse. The conveyor is very strong, and of simple construction. It is shown in the annexed figure, as well as the head of the fork. It will be seen that the conveyor is locked to the catches L and I, which are fastened to the iron rod on which the conveyor travels. When the load is raised by the draft of the pulley-horse, the top of the pulley-frame C comes against and raises the stirrup N, liberating the adjustable lock O O, which now holds the rope G in its position until it is conveyed to any desired position. The load is liberated by pulling the trip-cord, one end of which is shown at P. I saw the apparatus at work, and was quite satisfied with the results. Messrs. A. J. Nellis and Co., Pittsburgh, Pa., are the makers of the double-winged fork just described. This firm does not manufacture a conveyor, but the load is moved along a rope by simple pulley and leverage. They have invented grapples which can be attached to the roof of a barn, affixed without climbing, and as easily removed. In order to make use of the grapple, all that is necessary is to attach the holder to the end of a pole the length required to reach the point at which it is to be fixed, and attach the pulley to the hook. It is now raised to the required place in such a way that the end of the fork and the prongs of the holder rest against the centre rafter (joist or beam), held firmly with one hand, the rope being held with the other, and receiving a stout, quick, outward swing, which causes the grapple to swing from the socket, and the points cleave firmly to the desired place.

One of the most practical of these useful inventions was shown by a Canadian, Peter Grant, of Clinton, Ohio, the *Excelsior Hay-fork* and *Conveyor*. The latter is very simple. The friction-wheels travel on an ordinary scantling, 3″ × 4″, with simple supporting hooks in the centre. The fork has three tines, the centre one being provided with the double harpoon. The barbs rest on the shoulders of the standard, which gives great strength. The conveyor-frame has friction-wheels both above and below the rail.

PLANTING MACHINERY.

Grain Drills—though entirely confined to the American Section—were numerously represented, and, as will be seen when I enter into details, many possessed great merit. No field trials were arranged, and the Judges organised a series of tests in the buildings, which enabled them to judge of comparative merit, and gave great satisfaction to the exhibitors themselves, who had not before been subjected to so searching an inquiry. I may state that the idea of these trials was suggested by tests applied by the Royal Agricultural Society's Judges at the Bedford trials in 1874; when, after the ordinary trial, "small bags were hung on the upper seed-tin of each coulter, and after the run their contents were carefully weighed." But whereas the Bedford trials were on the level only, those at Philadelphia included five different positions—viz., on the level, with the right-hand side of the drill elevated at an angle of one in thirty, left-hand similarly raised, and in two other positions, representing going down and up steep inclines. And all this was done without moving the machine from its stand in the Hall. The wheel, raised clear of the ground, was made to re-

TABLE II.—Showing the VARIATION in the DISTRIBUTION of SEED from the CUPS of CORN-DRILLS EXHIBITED at PHILADELPHIA.

	Cup 1.		Cup 2.		Cup 3.		Cup 4.		Cup 5.		Cup 6.		Cup 7.		Cup 8.		Cup 9.		Cup 10.		Total.		Max.		Min.		Variation.		Variation per Acre from Level.	
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs	lbs.	ozs.	lbs.	ozs.	lbs.	ozs	lbs.	ozs	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
McSherry & Co.*																														
On level ground	2	0¼	2	0¾	2	0¼	2	1¼	2	0½	2	0¾	2	0¼	2	0	..		..		16	4½	2	1¼	2	0	0	1	..	
Right-hand Elevation ..	2	0	2	0¼	2	0¼	2	1	2	0	2	1	2	0¾	2	0	..		..		16	3¼	2	1	2	0	0	1	− 0	10
Left-hand Elevation ..	2	0	2	0	2	0½	2	0¾	2	0¼	2	1	2	0¾	2	0	..		..		16	3	2	1	2	0	0	1	− 0	12
Down Hill	1	12¾	1	11¼	1	13	1	15¾	1	12¾	1	13½	1	13	1	12¾	..		..		14	6¾	1	13¾	1	11½	0	2¼	−14	14
Up Hill	2	3¼	2	6	2	3¼	2	3¾	2	2¼	2	3¼	2	3¼	2	2¼	..		..		17	11¾	2	6	2	2¼	0	3¾	+11	10
FARMERS' FRIEND MANUFACTURING Co.†																														
On level ground	1	15¾	1	15	1	14¾	1	15¼	1	13¾	1	14¾	1	14¼	1	14¾	..		..		15	6½	1	15¾	1	13¾	0	2	..	
Right-hand Elevation ..	1	15¼	1	15	1	14¾	1	15¼	1	13½	1	14½	1	14½	1	15	..		..		15	6	1	15½	1	13½	0	2	− 0	4
Left-hand Elevation ..	1	15¾	1	15¼	1	14¾	1	15¼	1	13¾	1	14½	1	14½	1	15	..		..		15	6¾	1	15¾	1	13¾	0	2	+ 0	2
Down Hill	1	10¾	1	11½	1	11½	1	10½	1	10¾	1	10½	1	10¾	1	10¾	.		..		13	5¾	1	11½	1	10	0	1½	−16	6
Up Hill	2	1¾	2	1	2	0¾	2	1½	1	15¼	2	0¼	2	0¼	2	0½	..		..		16	5½	2	1¾	1	15¼	0	8½	+ 7	8
P. P. MAST & Co., BUCK-EYE DRILL.‡																														
On level ground	2	0¾	2	0½	2	0¼	2	0½	1	15¼	2	0¼	2	0½	2	1	.		..		16	3	2	1	1	15¼	0	1½	..	
Right-hand Elevation ..	1	13¼	1	13	1	18¼	1	13¼	1	12¼	1	13	1	13	1	13½	..				14	8½	1	13½	1	12½	0	1	−13	4
Left-hand Elevation ..	2	3	2	2½	2	3	2	2¾	2	2	2	2½	2	2	2	2½			..		17	4½	2	3	2	2	0	1	+ 8	10
Down Hill	1	12¼	1	11½	1	10¾	1	11¾	1	10½	1	11¾	1	12	1	11¾	..		.		13	12¼	1	12¼	1	10½	0	1¾	−19	6
Up Hill	2	6¼	2	5¾	2	7¼	2	6¼	2	4½	2	4¾	2	5	2	5¾	.		..		18	14	2	7¾	2	4½	0	3¼	+21	8
HOOZIER DRILL COMPANY.§																														
On level ground	2	7¾	2	7¾	2	6¾	2	8	2	9	2	7	2	6¾	2	6¼	..		..		19	11¼	2	9	2	6¼	0	2¾	..	
Right-hand Elevation ..	2	8¾	2	8¾	2	8¼	2	9¼	2	10	2	8	2	7	2	7¾	..		..		20	4	2	10	2	7	0	3	+ 4	6
Left-hand Elevation ..	2	9¾	2	10	2	8¾	2	10¾	2	10¼	2	9¼	2	8¼	2	9	..		..		20	12¼	2	10¾	2	8¼	0	2½	+ 8	8
Down Hill	2	5¼	2	5¼	2	5	2	5¼	2	6¼	2	4¾	2	3¾	2	4¼	..		..		18	8¾	2	6¼	2	3¾	0	2¾	− 9	4
Up Hill	2	10¼	2	11¼	2	10¼	2	12	2	12	2	10½	2	10½	2	10¼	..		..		21	8	2	12	2	10¼	0	1¾	+14	6
HAGGERSTON DRILL COMPANY.‖																														
On level ground	1	9¼	1	11	1	15¼	1	12	1	10¾	1	14¼	1	15½	1	11¾	..		..		14	4¼	1	15½	1	9¼	0	6¼	..	
Right-hand Elevation ..	1	8½	1	10¾	2	0¼	1	10¼	1	9½	1	13	1	14¼	1	10	..		..		13	12¼	2	0¼	1	8½	0	7¾	− 3	14

Left-hand Elevation ..	1 8¾	1 10¾	1 15¾	1 10¼	1 9¾	1 12½	1 14	1 10	..	..	13 11¾	1 15¾	1 8¼	0 7	− 4 4
Down Hill	1 9¾	1 11	1 15	1 10¼	1 10¼	1 13¼	1 18¼	1 10¼	..	..	13 12¾	1 15	1 9¾	0 5¼	− 3 12
Up Hill	1 9¾	1 11¼	2 0	1 11¼	1 10¼	1 13¾	1 14¼	1 10¼	..	..	14 0¼	2 0	1 9¾	0 6¾	− 1 14
Ludlow & Rodgers Superior Drill.¶||															
On level ground	1 9¾	1 12	1 11½	1 13	1 11¼	1 10	1 12½	1 11	1 13	..	15 8	1 13	1 9¾	0 3½	..
Right-hand Elevation ..	1 10	1 11½	1 10¼	1 11	1 10	1 9	1 10½	1 10	1 11	..	14 13¼	1 11½	1 9	0 2¼	− 5 6
Left-hand Elevation ..	1 11¾	1 13¼	1 12¼	1 12¾	1 11¼	1 9¾	1 11	1 9½	1 11	..	15 6½	1 13¾	1 9½	0 3¾	− 0 12
Down Hill	1 7¾	1 10	1 9½	1 11¼	1 10¾	1 9¾	1 12¼	1 11	1 13½	..	14 15½	1 13½	1 7¾	0 5½	− 4 4
Up Hill	1 11	1 13¾	1 13	1 14¾	1 12½	1 11½	1 13¼	**	..	..	16 2	1 14¾	1 11	0 3¾	+ 5 0
Johnston, Gear, & Truman.††															
On level ground	1 10¼	1 10¼	1 10¼	1 10¼	1 10¾	1 10¾	1 9½	1 9¾	1 9¾	..	14 12	1 10¾	1 9½	0 1¼	..
Right-hand Elevation ..	1 10¾	1 11	1 10¾	1 10¾	1 11¾	1 10¾	1 10	1 10¼	1 10½	..	15 0½	1 11¾	1 10	0 1¾	× 2 4
Left-hand Elevation ..	1 9¾	1 10	1 9¼	1 9¾	1 10	1 9½	1 9	1 9½	1 9½	.	14 5¾	1 10	1 9	0 1	− 3 2
Down Hill	1 8¼	1 8¼	1 8	1 8½	1 8½	1 8	1 7½	1 7¾	1 8	..	13 9	1 8½	1 7½	0 1	− 9 8
Up Hill	1 12¾	1 12½	1 12¼	1 12¼	1 12¼	1 11¾	1 11½	1 11¾	1 11¾	..	15 13¼	1 12¼	1 11½	0 1½	+ 8 10
Bickford & Huffman.‡‡															
On level ground	1 13	1 13	1 12¼	1 12¼	1 13¼	1 13¼	1 13½	1 13¼	1 14	1 12¾	18 2¼	1 14	1 12¼	0 1¾	..
Right-hand Elevation ..	1 12¾	1 13	1 12¼	1 12¼	1 12¼	1 13¼	1 13	1 13	1 13¼	1 12¼	17 15¼	1 13¼	1 12¼	0 1¼	− 1 8
Left-hand Elevation ..	1 13¼	1 13¾	1 13	1 13	1 13¼	1 13¾	1 13¾	1 13¼	1 14¼	1 13¼	18 6¾	1 14¼	1 13	0 1¼	+ 2 2
Down Hill	1 12¼	1 12¼	1 12¼	1 12¼	1 11¾	1 12¾	1 12¾	1 12¼	1 12¼	1 14¼	17 12¼	1 13¼	1 11¾	0 1¾	− 8 2
Up Hill	1 14¾	1 14¾	1 14	1 13¾	1 13¾	1 13¼	1 11¼	1 14½	1 15	1 13¾	18 0¾	1 18	1 16¼	0 1¾	− 0 12
H. L. & C. P. Brown, The Empire Grain Mill.§§															
On level ground	1 7¾	1 8¼	1 8¼	1 9	1 8¼	1 7¾	1 7¾	1 7½	1 6¼	1 7¾	14 15¼	1 9	1 6¼	0 2¼	..
Right-hand Elevation ..	1 7¾	1 8¼	1 8¼	1 9	1 8¾	1 7½	1 7¾	1 8	1 6¾	1 8	15 0¼	1 9	1 6¾	0 2¼	+ 0 8
Left hand Elevation ..	1 9	1 9¼	1 10	1 10¾	1 10½	1 9¼	1 9¼	1 9¾	1 8¼	1 9¾	16 0¼	1 10¾	1 8½	0 2¼	+ 8 8
Down Hill	1 6¼	1 7	1 6¾	1 7½	1 7½	1 6¾	1 6¾	1 6¾	1 6	1 7	14 12¼	1 7¼	1 6	0 1¼	− 1 8
Up Hill	1 12¾	1 13¼	1 13¼	1 14	1 14	1 13¼	1 13½	1 13¾	1 12¾	1 13¾	18 6¼	1 14	1 12¾	0 1¼	+27 8

---

* Recommended as very accurate.
† Recommended as accurate.
‡ No report, as too great variation on hill-sides.
§ No report, on account of irregularity on hill-side.
|| No report, on account of great irregularity between cups
¶ No report, on account of irregularity between cups.
** Nos. 8 and 9 not weighed by mistake; calculated at the average of the others.
†† Recommended for regular discharge of cups in all positions.
‡‡ Recommended for regularity of delivery under all conditions.
§§ No report, on account of great difference on hill-side.

volve a given number of times, according to its circumference, representing a traverse of one-eighth of an acre. Seed at about the rate of 2 bushels an acre was used; and the experiments were tried with wheat, oats, and beans. In the preceding Table the results of wheat only are given. It will be evident that the hill-side tests, as compared with those on the level, are of the greatest importance, because, wherever the land is inclined, the drill will be used across the incline rather than up and down, as in the latter direction there would be a great danger of heavy rains washing the seed out of the drills. The results of these tests surprised none more than some of the exhibitors themselves, completely falsifying the statements of and reasons for superior efficiency; in more than one instance popular and highly laudated machines being thrown out as unworthy of award.

It will be seen by a comparison of the above with Mr. G. Purves Smith's report of the Bedford trials, that the variations were less marked even in the worst cases, and this I attribute to the presence in all the American drills of some kind of force-feed, a most important and valuable arrangement, and which completely supersedes the revolving barrel with discs and seed-cups which is still retained in the majority of English drills. There are various ways in which a force-feed is secured. The most common is to have a roller on the shaft, either fixed or shifting, which, revolving in a confined position (the seed-cup) carries a certain quantity of seed round with it for each revolution, and the seed falling away from it is received by the tubes which convey it to the ground; these rollers vary as to form and surface corrugations; but, according to these experiments, their efficiency depends upon whether the roller occupies all the space between the sides of the seed-cup, or only a varying portion, according to the quantity of seed to be sown. In the latter case, it will be readily understood that when the inclination of the drill causes the seed to fall away from the roller, a less quantity of seed will be sown than either on the level or when the seed accumulates over the roller. In all cases in which the roller filled the seed-cup the sowing was most regular. Another point requires notice, and that is the mode of regulating the quantity sown. This is done in two ways; either on the old-fashioned plan of a change of wheels affecting the revolution of the spindle, or by closing or opening the mouth of the seed-cups. The latter plan has apparently two advantages: (1) That the regulation can be as minute as possible, and (2) whilst the machine is in motion, all that is necessary is to give a turn to a lever handle; whereas, with one exception (Farmers' Friend Drill), change of gear-wheels can only be done when the drill is stationary, and thus consumes more or less time, besides the

risk of losing the wheels. Notwithstanding this, I am satisfied that the old plan is by far the best. In support of this view, the Judges in their Report directed attention to a comparison of results in the case of *Bickford and Huffman's* machine and in that of *Ludlow and Rodgers.* These machines are identical in construction except that the former regulates the delivery by a change of wheels, the latter by closing the outlet, yet the result was much in favour of Bickford and Huffman. The difference of discharge from different cups of the latter ranged during the trials from 1¼ oz. to 1¾ oz., whereas in Ludlow and Rodgers's drill the range was from 2¼ to 5½ ounces.

In the *McSherry Drill* from Dayton, Ohio, the force-feed roller has spiral ribs, so that before one rib has finished discharging, at one side, the next rib, carrying up an equal amount of grain, has commenced discharging on the other side. A patent washer is attached at the end of the wheel. The feed-wheel and washer are illustrated in the annexed cut, Fig. 31. The seed-cups are fixed in the bottom of the hopper, so they are constantly full of corn. No attention whatever is required to insure regular discharge. It will be seen by the drawing, Fig. 32, that the opening for the discharge of the seed is considerably above the bottom of the cup; the object of this is to prevent waste of grain whilst the drill is being travelled when not in work. This is an exceedingly strong, well-made machine, especially commendable for a patent iron lift-bar, which is strong, neat, and durable. By raising the bar, the hoes are withdrawn from the ground, and the flow of grain so instantaneously cut off that not a grain is wasted. The grass seeder is thrown out of gear, and the land-measure raised so as not to measure. The latter, which is attached to several of the best machines, is a small apparatus for indicating the area traversed during work. It consists of a thread on the seed-spindle actuating a small-toothed wheel, which drives an indicator on a dial-plate: as all motion is communicated from the seed-shaft, it only registers during actual work; and thus, without pretending to absolute accuracy, for it is clear that inequalities of surface as well as the size of the change-wheels employed will affect the result, we have a useful approximation, a guide to the operator as to the distribution of the seed, and a tell-tale for the master as to his servants' industry.

Fig. 31.—*McSherry Drill Force-feed Spindle.*

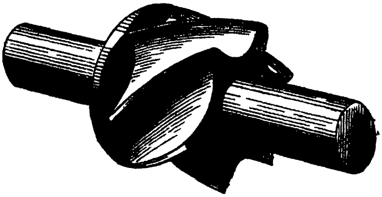
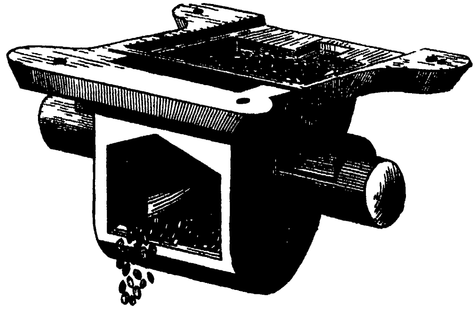


Fig. 32.—*McSherry Drill. Seed-cup, and Spindle-knife in interior.*



In the *Farmers' Friend Drill*—also made at Dayton, Ohio—a place which appears celebrated for this class of manufacture, as these two were decidedly the best drills tried—the force-feed roller is cylindrical, with eight zigzag ribs, each alternate one running in the opposite direction; the wheel is slightly concave, and as it revolves the grain is forced out from both sides of the cup, and a regular discharge is secured. The following figures (Nos. 33 and 34), represent the form of the roller and the delivery of the grain. Before one side of the wheel has fully discharged the grain, the other is coming up with an equal quantity. Fig. 35 gives a sectional view of the wheel and cup. The projections on the bottom of the cup (Fig. 35) are for the attachment of the cup of the India-rubber tube, which is so hooked on that it cannot come off from the motion of the drill.

Figs. 33-35.—*Distributor of Farmers' Friend Drill.*

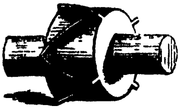


Fig. 33.—FORCE-FEED SPINDLE.

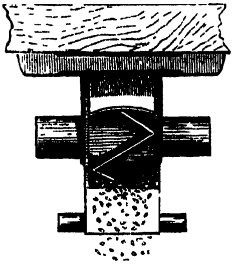


Fig. 34.—SEED-CUP.

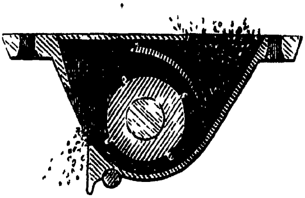
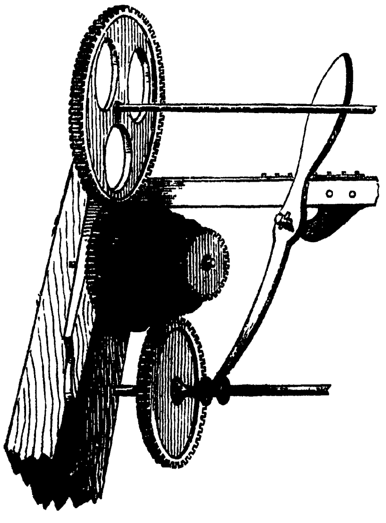


Fig. 35.—SECTION OF WHEEL AND CUP.

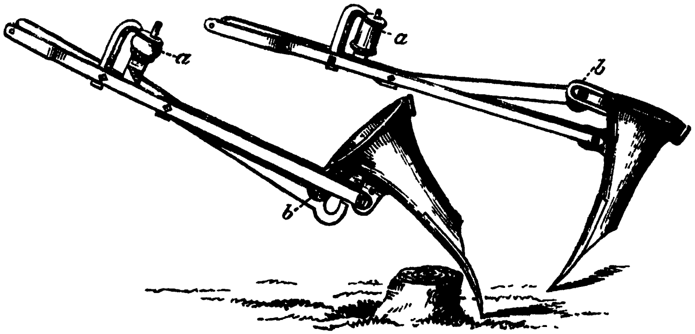
Fig. 36.—*Arrangement for altering Quantity of Seed distributed by Farmers' Friend Drill.*



In both these drills the quantity of seed is regulated by change-wheels, but in the Farmers' Friend, by means of a cluster of wheels on a cone, the alteration can be effected instantaneously whilst the drill is in motion: this will be understood from the annexed drawing (Fig. 36). The change is made by pressing on a lever to which the cone is attached, which raises it out of gear, and moving the wheel on the shaft, right or left, into any of the wheels of the cone, the rear end of the shifting lever moves over a notched plate, where figures indicate what each wheel will sow; half-peck changes can be made. The hoes or coulters are fixed as to the intervals at which the seed is drilled; this is universal, and it is regrettable as limiting utility; the distance is generally 8 inches, the coulters numbering from 8 to

10, according to the width between the wheels; these hoes are attached to two frames, or half to a fixed frame and half (the alternate ones) to a movable bar. In the Farmers' Friend the movable bar is attached to an iron bar which passes to the rear of the drill and is attached to a cross-piece in the frame by a stationary pin. When it is wished to set the shifting coulter forward so as to secure a zigzag line to the hoes or coulters, all that is necessary is to raise this bar out of the pin and push it forward until the pin comes in another hole of the bar and fastens itself. In dirty ground, or where there are stones or large clots, the zigzag line offers greater opportunity for the drill to clear itself, by providing larger spaces between the coulters; when the soil is clear and well cultivated, the ordinary position is preferable. The coulter is attached to the arm by a joint in connection with an India-rubber spring. Should the point of the coulter come in contact with a stump or fast stone which, in newly reclaimed land is frequently the case, it turns back owing to the joint, and as soon as the obstruction is removed or rather the machine is set free from the obstruction, the coulter or hoe acted upon by the rubber spring flies back to its original position. Several of the best drills had this contrivance, but in most the ordinary pressure on the point of the hoe during work is conveyed directly to the India-rubber spring, which consequently is liable to become weakened and lose its efficiency. In the Farmers' Friend an important improvement has been introduced, which will be at once understood by the following illustration (Fig. 37). When the hoe is sprung back a notch or latch is seen near the end of the middle bar, which is the lever. The rubber spring *a*, *a*, pressing on the end of this lever brings the hoe or coulter back to its place after being sprung, when a roller in the rear of the hoe *b*, *b*, comes in the latch above mentioned, and is arranged so as to make a positive lock which a continuous strain does not break, but when a quick, sharp blow is given, then it starts the little roller in the latch, and the hoe gives way to be brought back again by the India-rubber spring. I may here mention, as essential to all the best class of drills, the presence either in front or behind, or reversible, of a small-seed distributor.

Fig. 37.—*Arrangement for Prevention of Breakages of Coulters in the Farmers' Friend Drill.*



The next drill to which I direct attention on account of the successful results obtained with it under all conditions is "*The Champion,*" manufactured by Johnson, Gear, and Trueman, Oswego, New York. The grain-distributor is a compromise between what is known as the peripheral and the side-delivery. The delivery or force-feed wheel is shown in elevation at A, in Fig. 38, p. 44, and in section in Fig. 39.

Figs. 38 and 39.—*Force-feed arrangement of " The Champion" Drill.*

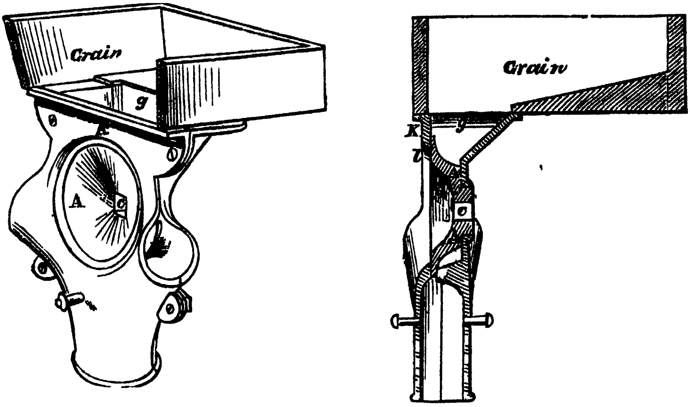


Fig. 38.—ELEVATION. Fig. 39.—SECTION.

Motion is given by a square shaft passing through the hole *c*. The casings of the wheel A form the seed-cup for receiving the grain, and also conducting it to the tubes. The upper portion of the cup has one perpendicular and one inclined side (see *g k*), forming a hopper. The flange of the force-feed wheel A comes well up into this hopper, and this is important, especially in sowing long-bearded oats or barley, as it insures a continuous supply. The quantity sown is regulated by change wheels. Grass-seeds are sown from a small detachable box holding about a peck. They can be dropped either in front or behind the coulters. The apparatus consists of a longitudinal reciprocating bar with notches of a peculiar form on the lower side, moving over a series of holes in a zinc bottom, the quantity being regulated by a slide which opens more or less of the apertures.

The fertiliser attachment may be shortly described. It comprises a rocking-shaft armed with a scraper, running the length of the box, and oscillating over holes in the bottom, which is hollowed conformably to the path of the scraper. The scraper works close to the bottom, and its action is two-fold, to keep the holes open and to force a portion of the fertiliser through at each oscillation; the scraper being inclined, and one edge slightly above the bottom. Under the box is a metal divider for scattering the manure. The bottom is made of heavy galvanised iron, the false bottom is of iron sliding on wood. The scraper can be readily removed and cleaned. I have very little faith in the success of this apparatus, fearing that rich manures would work up into a pasty condition.

The last drill to which I shall direct attention is " *The Farmers' Favourite*," made by Bickford and Huffman, Macedon, New York. The peculiarity in this invention consists in the fact that the force-feed wheel forms the separation between two chambers or seed-cups; these, having on either side projections at differing distances, form a small-seed and a large-seed apparatus combined. This is rather ingenious; and as either opening for the hopper is closed or left open by sliding the grain bottom (a series of inclined planes or bevels which form perfect funnels over each feed or run), this part of the arrangement is very complete. A vertical feed-wheel, however, is not so well adapted for sowing at angles, as the horizontal feed-rollers already described, a reference to the Table will show that, though the result was sufficiently creditable to justify an award, it does not come up to the figures in the McSherry and Farmers' Friend Drills.

The seed is delivered fron the internal flange of the feed-wheel. This flange serving as a bottom for the distributor, the grain rests upon it, consequently, when the wheel is revolved, as the frame is level, the seed travels with it, insuring a steady, even, delivery of grain. My chief object in describing this drill is to direct attention to the fertiliser attachment, which of all that were tried is the one that commends itself to favourable consideration. The distributor consists of a series of star-shaped scrapers, which fit close to the bottom of the box and revolve. They comprise simple castings, of which the following is a representation. The edges are sharp and the under-surfaces slightly concave. The gear under the machine is furnished with a square stem or upright, which fits rather loosely to the stirrer, allowing of play to accommodate for wear and warping of galvanised bottom. Within reach of the scraper are the diagonal openings in the bottom of the hopper. The covering spaces consist of slides of wood covered with metal actuated by a lever, indicated by the dotted lines (Fig. 41). The action of the scraper is to bring the manure over the opening, also to cut lumps in pieces. Under trial a favourable result was obtained. The manure used was a dry, poor, superphosphate, not fat enough to afford the test that was wanted. It was first used in a dry state, and afterwards well wetted. The Table shows the produce from each opening.

Figs. 40 and 41.—*Distributor of Farmers' Favourite Drill.*

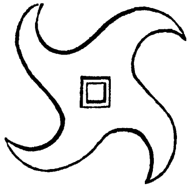


Fig. 40.—PLAN OF SCRAPER.

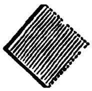


Fig. 41.—PART OF BOTTOM OF HOPPER.

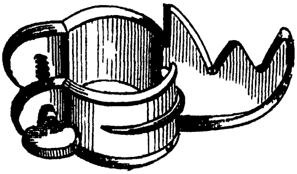
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	Total.	Max.	Min.	Variation.
DRY.												
First Trial ..	1·3	1·5	1·2½	1·1½	1·2	1·3	1·4	1·7	9·12	1·7	1·1½	5½
Second Trial	0·12	1·4	1·1½	0·14½	0·13½	1·0½	1·1	1·5	8·4	1·5	0·12	9
2. TRIAL WITH MOISTENED MANURE.												
No. 1	1·12	1·15	1·12½	1·12	1·14	1·12½	1·13½	1·15	14·11	1·15	1·12	3
No. 2	1·11½	1·15	1·12	1·12	1·12½	1·12	1·14	1·13½	14·6½	1·15	1·11½	3½

The object of these tests was to see the difference in discharge, at first when the manure was well disintegrated, and after it had been worked up by the stirrers. It will be seen that in the case of the damp manure, the delivery was even more regular than with the manure in a dry state; each test was on the $\frac{1}{16}$ of an acre, consequently the range in the last experiment was only 3½ lbs. per acre, between the maximum and minimum discharge, which may be regarded as practically identical. This very remarkable result fully justified the judges in awarding a medal.

Before leaving the subject of grain distribution, I must notice *The Philadelphia Broad-cast Seed-Sower* (Buist and Aldens), a remarkably simple and efficient machine, which is made in two sizes. The No. 1 machine is fixed in an ordinary waggon, and consists of a large hopper with adjustable feed, from which the corn drops into a horizontal screw fan, which revolves rapidly and distributes the seed in a uniform shower; the motion is derived from the spokes of the hind wheel by chain-gearing.

The simplicity and efficiency of the patent attachment by which the chain-gear can be applied to any ordinary wheel-spoke is very commendable. This consists of a series of clips attached to the spoke by tightening a screw, the mechanism of which will be fully understood by the following illustration.

Fig. 42 —*Patent attachment of Chain-gear to Wheel-spoke.*



At the present day broadcast sowing is not generally approved, and I should hardly have felt justified in introducing this notice but for the extreme efficiency of the distributor, and the really admirable arrangement for obtaining the power, the patent clips being applicable to any machinery where a chain-gear is used. The rapidity with which the operation can be performed is remarkable, from 10 to 12 acres an hour being covered. No. 2 machine, made on the same principle is adapted for manual labour. The hopper and fan are carried in front of the sower, being secured by a buckle round the waist. The fan is worked by a small handle. With this machine, which costs 15 dollars, it is said that 4 acres per hour can be sown.

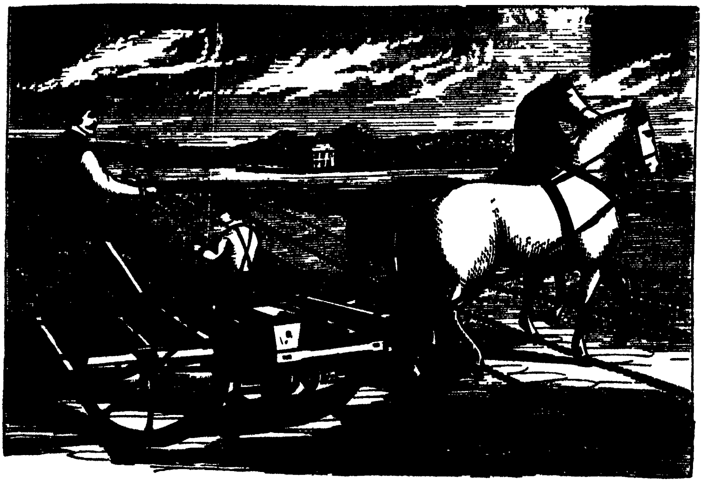
MAIZE OR "CORN" PLANTERS.

Before attempting to describe the machines for planting Indian corn, some notice of the crop itself, which forms the staple product of the Northern States, may be interesting to my readers. No one who has not seen the reality, can form a just conception of the rapidity of growth, grandeur of appearance, and exceeding productiveness of this most valuable cereal. My observation was confined principally to crops growing in the State of Pennsylvania; anything that I there saw was but a feeble illustration of the magnificent proportions to which the crop attains in the Western Prairies, where thousands of acres may be seen without a break. My sojourn in America extended from May 21st to August 5th, an interval of eleven weeks. During that short period I saw the blade appear above ground, reach a height in many instances of 10 feet, put forth its beautiful and luxuriant flowers—a cluster of red stamens at the end of the stalk—whence the pollen in falling to the ground abundantly fertilises the female organs contained in the cobs, which appear at different parts of the stem, surrounded by a leafy sheaf. Later on, the grains form; and all that remained after my departure was the ripening process. Although generally planted at intervals of 4 feet each way—three stalks together—so luxuriant is the growth, that the crop seen from a little distance appears to cover the entire surface. An average of 60 bushels of clean corn, frequently increased, under favourable circumstances, to from 80 to 100 bushels per acre, testifies as to productiveness, and this usually without the aid of home-made or extraneous manures. In Pennsylvania the ordinary rotation is as follows: Indian corn after seeds which have lain for two years and upwards, according to the nature of the soil and the requirements of the stock; oats without any manure; wheat usually dressed with ten or twelve loads of fold-yard dung. Timothy-grass is sown with the wheat and broad clover in the following spring. The seeds are mown for two years; if left down beyond this period, the clover disappears, and is replaced by natural grasses, which, with the Timothy-grass, afford good grazing for cattle, and more rarely for sheep, for as long as is desirable, resting and enriching the surface. A small area of potatoes and a few mangolds are occasionally grown, but not in sufficient quantities to occupy a fixed position in the rotation. It will thus be seen that the Indian corn is taken at a time when the soil is enriched with vegetable matter. The land is deeply ploughed early in spring, left until the sod is decomposed, when it is thoroughly broken up by the cultivator, and well worked down by frequent harrowing, rolling, &c. In this way a fine clean and deeply-cultivated seed-bed is prepared. As the period for sowing approaches, generally from the first to the second week of May, the surface is marked out by running the corn-planter empty in one direction, lines being thus drawn at intervals of 4 feet. The seed is then dropped exactly at the points where the machine intersects these lines at right angles, three to four grains being dropped in each spot. Sometimes the planting is done by hand; in this case the surface is marked out in both directions, and the workmen, with a bag of seed and a small hoe, scrapes away the soil, deposits three seeds not too close together, and draws up a little soil, so as to mark the seed-bed by a mound. On a large scale, and when accuracy of work is cared for, the machine makes the best job; and, as we shall see, by modern inventions the dropping of the seed is made automatic, whereas in ordinary planters a boy actuates a lever, which causes the discharge of the seed at the proper intervals. No sooner is the crop above ground, than cultivation commences, and is vigorously pursued until rendered impossible by the growth of the plant. Nothing tends to luxuriance so much as the frequent stirring of the soil, the crop requiring plenty of air at the roots. Occasionally, with the last hoeing, turnip-seed is scattered between the rows. In favourable seasons, useful sheep-keep results; but more commonly a pumpkin-seed is introduced into every third hill. The produce spreads like a network over the surface; and when the corn is cut, there is a very useful supply of cattle-food, the pumpkins attaining considerable size. Sometimes the cattle are turned into the fields, consuming the pumpkins on the bines; but experience has proved that this is a dangerous practice, inasmuch as the seeds injuriously affect the kidneys; and the better plan is to cart the produce on to grass-land, chop the pumpkins in two, and carefully remove the seed, when they may be eaten with impunity, and form useful autumnal food. It should be stated that the growth of this additional crop is not supposed to detract from the yield of the corn. Indian corn is a hardy crop, little liable to insect injury, its chief enemy being the cut-worm, a maggot which severs the stalk below the surface, and in some seasons causes much injury in an early state. Thorough cultivation is the best antidote, replanting the only remedy. Such a vigorous and rapidly growing crop requires both heat and moisture, conditions which are fortunately generally present, the intense heat producing frequent thunder-showers, which are of great benefit. At the proper season, generally about the middle of September, the stalks are chopped down with a strong knife, or cut by a machine (of which the spiral-knife Avery stalk-cutter, made by G. W. Brown, of Galesbury, Illinois, appears the most efficient), stacked in bundles, which are held together by bands of straw. After due exposure, the cobs are stripped off by the hand, and carted to store-houses, where they are stacked in narrow spaces, exposed to a current of air, and thus thoroughly dried. The separation of the corn from the cob, formerly entirely effected by manual labour, is now done by machinery, to be described. The straw or stalks are re-tied into bundles and stacked for fodder. When steamed and chopped, they make valuable food. On one farm which I inspected, the whole of the corn was ground up for cattle and pigs, and the straw consumed in this way. I have no analysis of the straw, but from all I could learn, believe it to be superior in feeding properties to that of any other cereal.

Corn Planters were shown by several firms, mostly on a similar principle to those first made by G. W. Brown, of Galesbury, Illinois. Mr. Brown was originally a carpenter of Saratoga County, New York, who migrated West, and settled on a small farm, still continuing his old trade, now principally confined to repairing farm implements. The idea occurred to him that the cultivator then in use might be converted into a planter. After a number of experiments, a machine was produced in 1851, which, rude as it then was, was the original of the admirable planters which are now made by thousands, both by him and others. Very little was done until 1854, when he made 100 machines. In 1855 he removed to Galesbury, and in the following year he made 600 machines, and the year after 1000. At the present time his annual make is about 8000.

The machine exhibited at Philadelphia, known as *Brown's No. 2 Check-Row Planter*, has a new double-fulcrum lever by which the driver can raise and lower the front part of the machine at will, lifting it out of the ground or forcing it in to any required depth. It will be understood that the frame is entirely of wood, made in two parts, strongly connected together. In the No. 1 Planter the width can be altered from 3 feet 4 inches to 3 feet 7 inches, and 3 feet 10 inches, which is a special feature in this machine. The driver's seat is so placed in reference to the frame as to balance that of the dropper, who sits crossways and operates a small lever-handle, which works the seeding, or dropping plates, which are made in a circular form, and are hung on a pivot in the centre; when in motion the seed-chambers, *i.e.* the openings in the plate, pass in a curved line under a metallic cut-off, filling the chambers uniformly and without cutting or breaking the seed, and passing therefrom down through the tube to the heel of the runner, being there retained beneath the surface of the ground for the coming hill. I trust my readers will understand this action which, with modifications, is common to all planters. When the lad finds the box at which he is looking and on which is often placed a marker, in a line with the cross-marks, by pulling his handle he liberates the seed from the runner at the same time that a fresh charge is passed down ready for the next hill by the process described. The plates must be changed in order to vary the quantity of seed. In large fields 15 to 20 acres a day can be planted, three to four grains being placed in each hill; provided the corn is fairly uniform in size, these limits are seldom exceeded. The retail price of No. 2 machine is 50 dollars. It is strong, simple in construction, and not liable to get out of order.

Fig. 43.—*View of the Vandiver Corn Planter at Work.*



The Vandiver Corn Planter Company, of Quincey, Illinois, exhibited their *Vandiver Planter*, of which I am able to give a drawing and short description. The principal features are as follows:—The front portion is supported on two steel runners, which open out the bed for the seed. The hind part is carried on two 30-inch concave-rimmed iron wheels. The pole draws from a cross-bar above the axle. These two independent frames are connected by hinges, and thus have independent motion. The corn-boxes are of cast iron, containing a cup, or bottom plate, on which the seed rests. This cup has a "cut-off" attached. The box also contains a slide or "drop plate," which works under the bottom plate, and is connected with the same on opposite sides, by a bar to which an operating lever is attached. By a stroke or movement of this lever, given by the boy, the drop-plate is made to move under the cap or bottom-plate. The cap has an oblong hole about 6 inches by 1½ wide, and has the cut-off at the centre of this hole. As the drop-plates slide under the cap, the corn lodges in a round hole (there are two in each plate), and as the hole passes under the cut-off all surplus corn is brushed off, and only the proper quantity passed down into the valve, which is in the runner standard. Attached to the driver's seat is a crank-motion tip-up, which is necessary in order to raise the front part out of the ground—necessary at the land's end or in case of an obstruction, or for forcing the runners into the ground. The tip-up has two levers, one on each side of the seat-stand; and the driver, by pressing his foot on the right-hand lever, raises up the frame, and the crank passing the centre and resting on the frame locks the front to position. By pressing upon the left lever the runners can be forced into the ground. The depth of planting is regulated by gauge-wheels, seen in the illustration (Fig. 43), which can be raised or lowered. At the back of the runners are placed corn shovels, which are attached to the runner standards by a hinge connection, which allows of free motion. Their object is to throw the earth over the corn, thus insuring perfect covering, even when the surface is unlevel. Having freedom of motion they rise over obstacles, and, moreover, can be operated on by means of foot-levers, the driver being able to raise them up if necessary. The valve is placed about 2½ inches above the ground. The corn lodges on one side, and when the valve is opened and the corn liberated it acquires sufficient jerk to insure sufficient distribution. Three to four seeds are planted at once, and it is a point of great importance to have these somewhat scattered, say three or four inches apart. The tube is so arranged that the working of the valve can be seen by the driver, and if anything is wrong he can instantly stop the machine. A scraper is provided, which can be brought up to the surface of the wheel by pressure. The reason for the concavity of the rims is to mark the line of the hills, allowing of early hoeing operations. The price of the Vandiver is 65 dollars.

The Keystone Manufacturing Company, Stirling, Illinois, showed a light, well-made machine furnished with a marker, comprising a strong arm shod with a marking termination; this marker shows the exact line for the wheel-track on the return journey. The dropping arrangements are decidedly well considered, the valve is so constructed that the corn, which falls but 2 inches, is sent with a side and backward motion which insures its being scattered in the hill. In front, and connected with the runner, is an adjustable shoe, by which the depth can be regulated. The seat of the dropper is made to slide backwards or forwards so as to secure the easiest leverage. The appearance is exceedingly light, but as the construction and material are good, there is no reason why such a machine should not be durable. Price 60 dollars.

Recently attempts have been made to supersede the attendant by working the dropping-lever by appliances which shall render the machine automatic. The oldest of these is known as the *Haworth Check-Row Planter*, made at London, Ohio, and comprises merely a quarter of a mile of rope knotted at the intervals at which it is desirable to plant. The rope is fast at both ends of the field, and passes across the front of the planter by means of pulleys. When the knots come in contact with the lever-rod the corn is dropped. This arrangement does away with the necessity for marking out the ground; a marker might be attached to the machine to show the exact line for the wheels on the return journey. The cost, 30 dollars, includes a quarter of a mile of rope. This simple invention is very highly spoken of, and I believe its use is rapidly extending.

Mr. Joseph Rothschild, of Shelbyville, Kentucky, exhibited an *Automatic Check-Row Planter* of an entirely novel and highly ingenious description, which, recently patented, is hardly yet in a perfect form, but which is so meritorious that I shall endeavour to make my readers familiar with its peculiarities. The drawings, which are from the patent specifications, show a vertical section and plan; the former (Fig. 44) taken through the line *x*, *x* (Fig. 45).

Figs. 44 and 45.—*Rothschild's Automatic Check-Row Planter.*

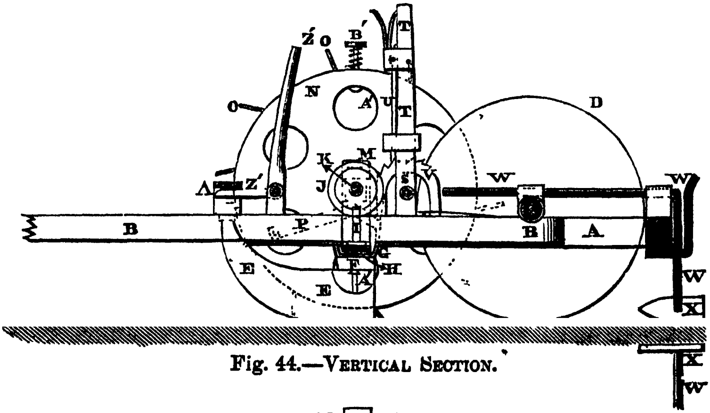


Fig. 44.—Vertical Section.

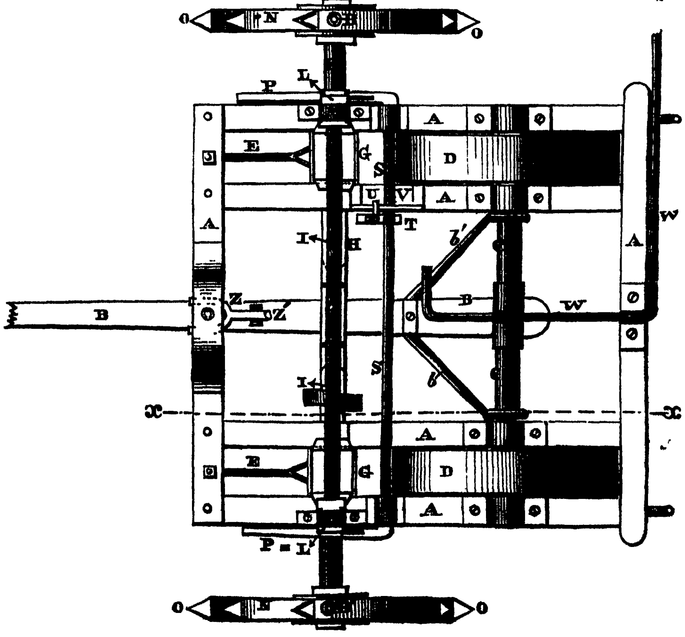
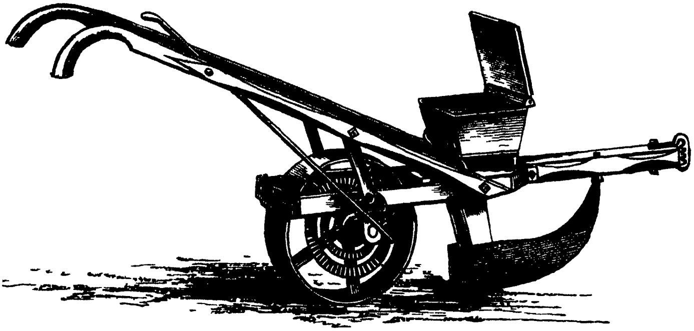


Fig. 45.—Plan.

The frame of the machine, of wood, comprises two pairs of side bars and two crossbars to which they are strongly attached, these are lettered A. B is the pole attached under the front cross-bar of the frame A, which is at this point arched by a guide-rod Z′, its rear end being pivoted to the axle C, and held in line by the braces *b′ b′*. The axle C carries the travelling-wheels, which, as will be seen further on, act the part of rollers in covering the seed, but have nothing to do with the mechanism by which the seed is deposited. E E are the runners that open the soil to receive the seed; they are attached in the usual manner to the frame in front, and to the sprouts or standards F behind, which are connected with the bottom of the seed-hopper G in the usual manner. It will be seen from the drawings that the wheels D D being immediately behind the spouts cover the seed. I now come to the novel arrangements. The seed is dropped by the bar H, which works in the lower part of the hopper G; to it are attached two upright studs, I I, at a little distance apart, so as to be acted on by the double cam-wheel J on the shaft K, each revolution of the cam-wheel causing the bar to be slid backwards and forwards. The cam, properly adjusted, is made to do the work of the boy in sliding the bar backwards and forwards. The shaft K revolves in bearings in blocks, L, that slide up and down in long keepers, M, attached to the frame A. The wheels N N, on the end of the shaft K, have on their rims sharp triangular projections, O, to enter the ground and prevent them slipping. Raising or lowering the shaft increases or diminishes the circumference of the wheels so as to drop the seed at a greater or less distance apart as may be desired. In this freedom of the shaft to move up and down is one great feature of the invention. By reference to the drawings it will be seen that the shaft S is connected with the bars P at their hinder end, whilst they are pivoted in front to the frame. The lever T with spring front U, which engages with the ratchet V, is attached to the shaft S. It follows that by operating the lever T, the handle of which is convenient to the driver's seat, the machine may be adjusted to plant the hills at varying distances apart. The wheels N are placed at a distance from the openers E, exactly one-half of the space from E to E, consequently they act as track-markers; and this, with the additional security from a heavy track-marker, shown in the plan at W X, which is reversible from side to side, insures accuracy in one direction. I have now to explain how the check-row accuracy is attained. Referring again to the wheels N N, it will be seen in the elevation that A′ A′ are pins passing out through the rims of the wheel, with discs B′ attached to their outer ends. Upon the pins are spiral springs, two of these pins, &c., are attached to each wheel directly opposite each other, and in such positions that one of the discs, B′, will always be on the ground when the seed is dropped, and thus accurately mark the cross rows. The springs enable the discs to make their mark however deeply the points O may enter the ground. If it should be found that the discs mark either short of, or beyond the holes made in the previous course, the driver by operating the lever T, and either raising or lowering the wheels, can instantly correct the inequality and place the machine in a correct position, then the action must be exact so long as the horses are driven straight. Undoubtedly, care and attention are requisite on the part of the driver; but considering that this machine does away with the necessity for marking out the ground, and dispenses with the dropper, thereby saving his wages and weight on the machine, I think it is an effort in the right direction which merits recognition. Referring once more to the elevation, it will be seen that by drawing the lever Z towards himself, the driver raises the fore part of the frame, together with the wheels N N, thus stopping the seeding; and by a pawl and ratchet the lever can be retained in this position for turning at the land's end or for travelling.

As an example of a one-horse single-row planter, of which several were exhibited, I produce a drawing of the *Dickey Corn Drill*, manufactured by the Haworth Planter Company, London, Ohio.

Fig. 46.—*View of the Dickey Corn Drill.*



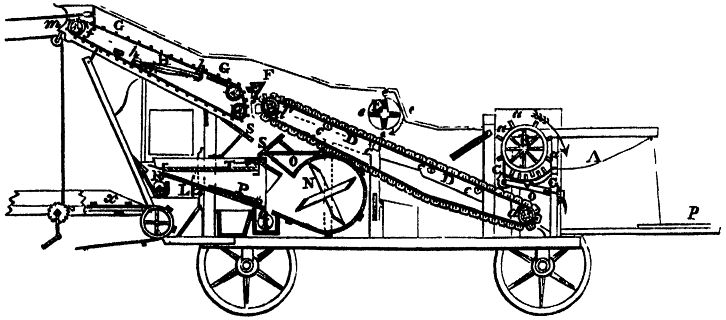
It will be seen that varying quantities of seed can be sown according as the pinion is engaged with the larger, medium, or smaller driving-gear, an adjustment which can be instantly effected by moving the lever rod which terminates between the stilts. The cut-off is of metal and acts in precisely the same way as in the ordinary planters, except that it is constantly revolving, and generally deposits the seed at closer intervals. The runner is made of cast steel, and iron is largely introduced in the frame. The wheel, having a broad rim, covers the seed, breaking clods very well. This drill is suitable for small occupations.

Messrs. Nash and Brothers, of Church Street, New York, exhibited a *Potato Planter and Slicer*, which deserves notice for simplicity of design and novelty of idea. The machine consists of a frame on two wheels, carrying a round hopper for the seed and a smaller receptacle of similar shape behind for artificial manure. The bottom of the hopper has one portion open, over this opening is fixed a horizontal knife in such a position as to secure a wedge-shaped cut, varying from $\frac{3}{4}$ to $\frac{1}{8}$ inch. Above the fixed bottom is a revolving plate, filling all the space and provided with eight circular openings, any of which can be covered if desired. These holes are 4 inches in diameter, but can be reduced by bushing-rings to $2\frac{1}{4}$ inches in diameter. Supposing that all the openings were uncovered, then slices of the potatoes are dropped at intervals of 9 inches. The machine is most suitable for round sets, which should be tolerably uniform in size. A set fills the opening and remains until sliced away; each slice, being wedge-shaped, will possess a portion of skin. There is a great saving of seed by the use of such a machine, but my readers will probably be sceptical as to the regularity of the crop, seeing that it must frequently happen that the slices will be cut off without any apparent eyes. This objection occurred during my examination, and was met by the statement, which at that time appeared incredible, that such slices would grow even without apparently any eyes at all. I have since experimented by planting slices cut off from round potatoes at the end where they are attached to the rootlets, and where no indication of an eye could be found, and although planted in July, and overshadowed by cabbage-plants, every one grew and small potatoes were formed. So far, then, the exhibitors' statement has been borne out. The question whether the produce is injuriously affected by the set being so much reduced in size, is one that can only be determined by careful experiments; opinions are very conflicting on this point. In favour of the machine it may be stated that, first introduced seven years ago, the trade was limited to 50 machines, whereas in 1875, 220 were sold. The inventor states that depositing sets at 9 inches by 30 inches, it was impossible to plant more than 13 bushels per acre, whereas according to our present practice, the same intervals would consume from 26 to 28 bushels, therefore the saving in seed would be most important, as well as the gain in time and cost of the operation. The distribution of the manure is effected by a plain revolving scraper, which brings the manure over a hole in the bottom of the hopper; this can be regulated to drop either at the same spot as the potatoes or intermediate between the sets. One great objection to machines hitherto has been that the set has a tendency to roll in dropping from the hopper, and, consequently, irregularity of position ensues; and this is especially the case where small ordinary whole seed is used. Now the wedge-shaped slices remain where they fall. A ratchet and spring on the wheels is provided to throw the depositor in and out of gear, and to stop the action whilst the machine is being turned at the land's end.

MACHINERY FOR PREPARING FOR MARKET.

Threshers.—In this department, which was largely represented, the exhibition was principally American, the few Canadian machines shown being built upon American models. Russia was the only outsider that exhibited, showing a powerful but cumbrous-looking implement, which, in its main features, follows English designs. I must admit being disappointed with the results of the trials, having heard extraordinary accounts of the amount of work of which the American machines were capable; it is quite true that several of the principal makers did not compete, but as the general principles of construction are very similar, it is not easy to see how their record could have been very different. The interest in this section would have been greatly increased if some of the best English machinery had been present. It appears to me that progress has lagged, and though both steam and horse-power threshers were invented long before mowing and reaping machinery was even thought of, they have not in America attained to similar perfection. It is probable that the form of drum adopted universally, and which is a modification of the old Scotch peg-drum, allows of a larger bulk of short straw being passed through than would be possible with beaters, but the straw is very much broken, and clean threshing at the first operation is impossible; consequently, an apparatus is attached in the form of a Jacob's ladder, by which the unthreshed or partially threshed heads, together with heads which, though threshed, have been broken off, short straws, and indeed every thing that passes over the tail of the caving-screen is brought back to the drum and re-threshed—a practical proof of the inefficiency of the drum. My readers will best understand the principal differences between the English and American machinery, by an illustration and description of one of the latter. I select "*The Farmers' Friend*," a 10 horse-power threshing-machine capable of being driven either by horse-power or steam, made at the Pitts Agricultural Works, Buffalo, New York.

Fig. 47.—*Section of " The Farmers' Friend " Threshing-Machine.*



A. Feed-board.
B. Drum.
C. Concave.
D. Grain-belt.
c, d. End rollers supporting rollers.
E. Beater.
F. Picker.
G. Straw-belt.
H. Agitator.
J. Fixed floor.
N. Fan.
O. Fan case.
P. Fine sieve
Q. Grain conveyor.
R. Tailings conveyor.
S. Guide-boards.
T. Sieve.
V. Concave raiser.
m. Opening for straw.
L. Eccentric.
x. Straw-elevator.

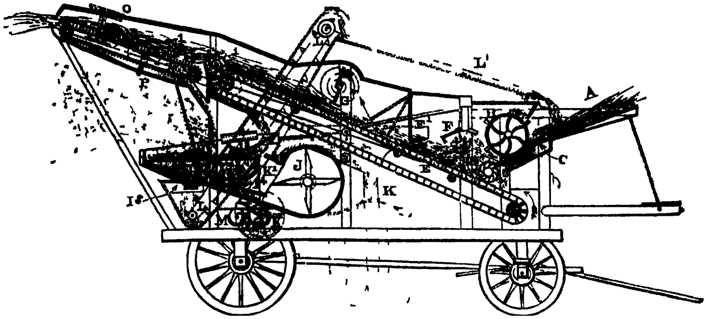
The workman who acts as feeder stands upon the platform *p*, and spreads out the corn upon the feed-board A, presenting the heads to the action of the pegs on the drum. The drum-axle is a solid shaft 1¼ diameter. The drum is 36 inches long with nine longitudinal bars, holding 104 teeth, which project

2½ inches from the face of the bars. The concave is made in three parts, with an adjusting screw, shown at V. The teeth on the drum, as they revolve, pass close to similar teeth in the concave. Such portions of the grain as are not separated by the blows from the teeth on the first contact are drawn with great force past the concave teeth, and thus the heads are combed out. Nevertheless, portions altogether escape, as is shown by the delivery from the return spout. The drum revolves from 1000 to 1300 times per minute. The drum pulley is 7 inches in diameter with 8½-inch face. The grain and straw fall together on to the grain-belt D, an endless belt about 10 feet long, composed of stout duck, on which are nailed cills or buckets, *b*, of maple, 1½ inch wide, with intervals of 1½ inch. The grain drops into these intervals and the straw rides on the top, its progress being expedited by the action of the beater E, an iron shaft with four arms furnished with fingers, *e*, driven from the opposite side of drum-shaft, and making about 400 revolutions per minute. This is an important feature, preventing the clogging of the machine, which would otherwise frequently happen in the case of damp straw. The supporting rollers *c*, *c*, *c*, *c*, being hexagonal, give a jerky motion to the grain-belt, which separates any loose grains lodged in the straw. The triangular revolving picker F, placed just above the end of the belt and between it and the straw-carrier, prevents the straw passing downwards with the grain, and assists its passage forward on to the straw-belt G, made of slats of wood nailed at short distances from each other to two leather belts, and forming an endless ladder running over the pulleys *f*, *f*. H is the agitator, a bar rocking on its centre, so that the ends *h*, *h*, shake the straw-belt alternately, giving it a jerky motion which effectually causes the separation of any loose grains which may have hitherto escaped separation, and which now fall through the open spaces of the straw, on to the inclined board J, whence they find their way to the shoe. The chaff is separated from the grain by the action of the fan N; the grain falls through the screen T, on to the fine sieve P P, which forms part of the bottom of the shoe. Weed-seeds, &c., escape into a box whilst the grain drops into the grain conveyor Q, a trough with a revolving screw, and is discharged at the side. The cavings, which include the unthreshed or partially threshed ears, pass over the end of the screen T, fall into the conveyor-box R, and are delivered by a similar screw to the elevators, by which they are carried back to the drum and re-threshed. A longitudinal motion is given to the riddle by means of the eccentric L. A light straw-elevator is attachable to the end of the machine, a portion of which with the side frame removed is shown at *x*, also the means by which the same can be fixed at any angle, viz., by a rope wound round a pulley with a ratchet and pawl to secure its position at any point; this is a very slight affair, and would hardly resist a strong wind, but it has the merit of cheapness and probably answers sufficiently well.

My next illustration of a machine of somewhat similar construction is the Paragon Threshing-Machine (Fig. 48), made by John Abell, Woodbridge, Ontario, which has some original features.

The revolving grate D, a small wheel furnished with a series of sharp sections, is a patented arrangement for assisting the passage of the grain from the drum, and at the same time acting as a rubber to separate whitecoats. This latter office is only, however, very imperfectly performed; and the chief advantage of the grate is that it forms a convenient medium for transporting the grain from the drum to the cills of the carrier. The latter is, both as to length and construction, very similar to the same apparatus in the Pitts Machine, only the friction-pulleys that support the carrier are round instead of hexagonal; there is also a slight difference in the form of the beaters and pickers, which will be at once seen by a comparison of the drawings. The picker G¹ makes about 1400 revolutions a minute, materially assisting the transfer of the straw on to the rakes, which travel at about half that pace and

Fig. 48.—*Section of Abell's Paragon Threshing-Machine.*



get a jerky motion from the blows of the agitator N¹; after the chaff has been blown away by the fan, the grain reaches the compartment K, the base of the grain-conveyor; here it is partially rubbed by the arms of a small fan, which forces it upwards along a small elevator tube by which it is conducted to the sack's mouth, the outlet being here sufficiently high to allow of a sack standing upright under it. The cavings, &c., fall over the end of the shoe to the base of the elevator L, by which they are conveyed back to the drum; by a clever arrangement of an angle pulley, shown by dotted lines at O, and chain gearing, the straw-elevator can be fixed at any angle, so as to convey the straw from the machine in any direction from a straight line to a right angle. Mr. Abell makes machines of different sizes, according as they are to be driven by steam, horse, or hand-power. As far as the winnowing process is concerned, this machine is similar to the single-blower English machines. The features that appear to me objectionable are, first, the character of the drum, which is not capable of removing all the grain at one operation. Ears can and do pass between the beaters on the drum and the concave almost without contact. The carrying a heavy weight of corn and straw from the base of the drum up a steep incline for a distance of 10 feet is a most needless expenditure of power. There is no reason that I can conceive why the threshed grain should not pass at once to the shoe by means of an inclined board. Thus would be saved the labour and wear and tear on pulleys and belts, &c., of conveying 40 or 50 tons of grain per day. In several of the more modern machines this arrangement is carried out. The straw-shakers having spaces between the frames, or holes bored, which allow the grain to pass through, and so reach the winnower without any additional labour, reciprocating forks assist the passage of the straw and the further separation of grain. I may draw attention to the machines made by G. Westinghouse and Co., Schenectady, New York, as successful examples of this form, and as doing creditable work under trial with a fair average crop; 638¼ lbs. of best corn resulted from 15¼ minutes' work—something over 1 ton an hour, not, however, by any means an extraordinary result. The drum is of peculiar construction; both it and the concave are composed of bars of wrought iron, channel shape, fitting to wood bars, through which the spikes are bolted. The elasticity of the wood prevents unusual strain. The concave and drum being both open, much of the grain passes directly to the winnower, and every portion carried on with the straw is sure to be separated by the jerky action of the straw-shakers, the straw being constantly knocked along by four rows of forks.

Tread-gears.—Several small machines for tread-power were exhibited, and some, which were subjected to trial, appeared to work

well. These machines were generally made for 2 to 4 horse-power, according to whether the tread-power or the horizontal-gear were employed, for it is an undoubted fact that much more duty can be got out of horses on the tread-mill than in working through ordinary gear—a strong prejudice exists against tread-powers under the idea that the labour is too severe, and that the animals suffer in their ankles and feet. This, undoubtedly, has been the case where the angle of the tread has been excessive, but properly adjusted with a sufficiently large driving-wheel and good bearings, the pace of travel not exceeding 1½ mile per hour, and the elevation not exceeding 14 or 15 degrees, it is quite possible that horses may actually gather weight whilst so employed; at any rate there is neither cruelty nor excessive depreciation, and for driving small threshing-machines, chaff-cutting, root-slicing, &c., such a power is very economical.

I select for illustration *The Level-Tread Railway Horse-powers* made by Heebner and Sons, Pa., with patent governor or speed regulator. The track-wheels which support the tread power are large, 5½-inch diameter; reels are provided at the front and rear end of the track, by which the endless chain is carried from the top to the bottom track and from the bottom to the top track in place of circles. This is advantageous as tending to stop the revolution of the wheels, which on reaching the lower track are set to work at once in the opposite direction. One special feature in this machine is the form of the platform, made of pieces of plank of suitable length, with tenons on the end, which are received in mortises in iron links, so constructed as to place the plank perfectly level for the horse to walk on, and are connected together with rolled-iron rods, which also serve as axles for the track-wheels. The governor will be best understood by reference to the annexed drawings.

Figs. 49–51.—*Level-Tread Railway.*

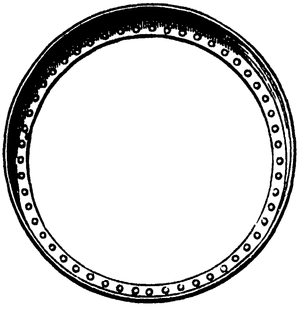


Fig. 49.

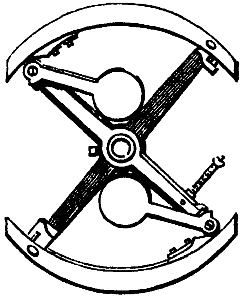


Fig. 50.

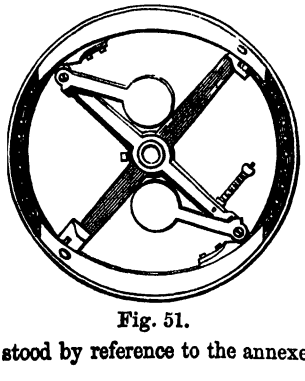


Fig. 51.

Fig. 49 is the rim or circle, fastened to the power behind the belt-wheel. Fig. 50 shows the hub with arms attached, also weighted balls, friction-block, and the stud with small coiled brass spring secured by a thumb-screw at the end to regulate the amount of speed. As the speed increases the balls fly out by centrifugal force and press the friction-blocks against the rim, which act as a brake, as seen at Fig. 49; as soon as the machinery is applied and takes the power, the balls drop back, and relieve braking. Fig. 51 shows the governor complete; Fig. 50 being fastened on the power-shaft by a set screw inserted in the rim of Fig. 49.

A novel arrangement of *running gear for tread-powers* was shown by Burt, Hildreth and Co., Harvard, Massachusetts; the patents are held by W. L. Boyes and Bros., of Philadelphia, who manufacture the same. The links are made with cogs; and the driving-gear, which is placed some distance from the end, and immediately under the propelling power, *i.e.* the horse's front feet, cogs into the chain-links both above and below. By this arrangement the power is very directly utilised, the driving-gear is acted upon only by the straight or parallel sections of the platform chain, thus entirely avoiding the irregular motion of the binding or end sections of the chain. It will be understood that the truck-wheels are clear of the track whilst passing from the upper to the lower track. The driving-gear also propels the bottom or returning sections up the inclined track and around the front end, avoiding the unnecessary friction of drawing the lower portion of the chain around the front end of the machine, which is so often the cause of unequal tension and of a jerking motion. By this arrangement, long sections and large truck-wheels (7-in. diameter) can be used, and fewer wheels are required, thus lessening friction. The advantages claimed, and I think justly, are as follows:—

1st. The truck-wheels are larger in diameter and fewer in number than in any other power in this class.

2nd. The platform chain moves with a smooth and free motion.

3rd. The returning sections of the chain are driven up their inclined track by the main gear, avoiding the loss of power caused by drawing a chain around the front end.

4th. There is no strain on the joints of the chain whilst bending in passing the end tracks.

5th All the pivots, axles and wheels are hardened and smooth, causing little friction.

6th. There are no cross-rods between the treads, to get bent out of place and add to the weight of the moving platform.

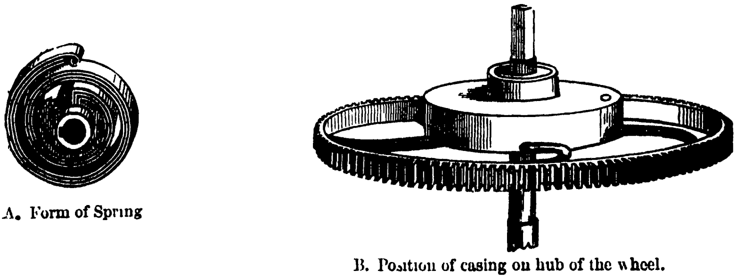
7th. The power is applied to the driving-gear on the straight portion of the platform, and the weight of the horses acts *directly* and always in a straight line upon the gear to propel the machine with great force.

Before leaving this part of my subject I must notice an ingenious application of a coil-spring to improve the connection between the power and the work. This, known as the *Eureka Coil-Spring*, is the invention of Mr. John A. Hafner, of Pittsburg. In considering the utility of this apparatus it should be remembered that the majority of threshing-machines in the States are driven by horse-power through horizontal gearing, as many as eight or ten horses being employed, but the spring proves equally useful when steam is the motive power—allowing of the connection by universal joint, which would be otherwise impossible. It is not necessary for me to dwell upon the utility of an elastic medium as a reservoir of power. The action of the horses is irregular, the momentum of the drum causes an immense leverage over the horses, and thus, but for this arrangement, much power could not be utilised. The spring being a reservoir of power, makes the allowance of space of time necessary between cause and effect. It fills the same office (in its place) as the air-chamber of a force-pump, and its importance in giving elasticity to machinery is equally great, because it utilises every jerk and gives out every pound it receives. The Judges applied the spring to a portable 4-horse machine, and proved its efficiency. The motion was steadier and the action less noisy.

The spring consists of three plates made of the best cast spring steel. These plates are riveted together at the inner hook end, and the strain on the outside plate, which is thickest, is tensile, whilst the strain on the inner plates is compressive, thus ensuring the durability of the spring. The spring is held in a casing of the spur-wheel which drives the drum-pinion. The outer end of the spring is connected with the casing, while the inner end connects with the centre hub. The hub is keyed fast to the shaft, whilst the casing is fitted to play freely on the hub, consequently the connection between the power and the work is elastic, and this has a tendency to equalise results. The cost is not excessive and the advantage decided.

Fig. 52 shows the form of the spring and the position of the casing on the hub of the wheel.

Fig. 52.—*Illustrating the Eureka Coil-spring.*



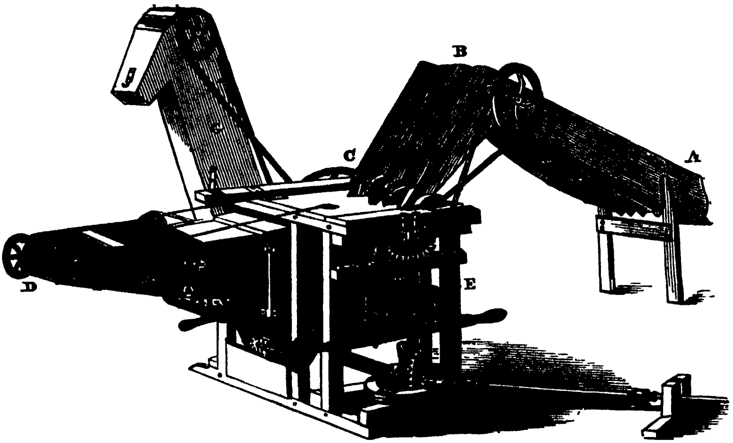
A. Form of Spring

B. Position of casing on hub of the wheel.

Indian Corn Machinery.—Machines for threshing and dressing Indian corn occupy an important position in America. The corn is usually husked, that is separated from the straw and the sheaf by hand, the operator being provided with spiked gloves, which save the hands and facilitate the process. Latterly a machine has been invented which effects similar operations. This is *Phillips' Corn-husker*, shown at Philadelphia by *R. H. Allen and Co.*, New York. It consists of a frame 4 feet long by 2½ feet wide; across one end near the top of the frame are two rollers provided with spiral grooves; the stalks are passed between, and ears great and small are separated. The stalks drop upon an elevator and are removed. The ears drop on to longitudinal husking rollers, upon their surface are spiral depressions or grooves and spikes, so arranged that the ear settles down between the rollers, and as it is made to revolve, the iron pins on the rollers effectually remove the husks, which are dropped upon the elevator, whilst the corn escapes at the end and can be carried away by an elevator if desired. I did not see this machine at work, but it is said to clean from 25 to 50 bushels an hour, the price being 150 dollars. Corn-shellers were shown in great variety, mostly for hand-power. These had the disadvantage of having no self-feeding gear; an attendant being required to place the ears in position; and few of them had any winnowing apparatus to remove dirt, &c.

The most efficient machinery was shown by *The Sandwich Manufacturing Company*, Sandwich, Illinois (*Adams' Patent*), which is worthy of description. Machines are made of various sizes; that which I shall illustrate represents a 4 horse-power sheller with cob rake and grain elevator complete (Fig. 53). The ear corn is thrown into the feeder A, which contains 4 revolving rubber straps with convex projections working between three bars or divisions, which ensure the straightening of the ears in their ascent. The corn is forced into the mill by a force-feed spindle with iron flanges. This arrangement, recently patented, is not shown in the figure. The ears fall down the incline B to C by their own gravity, are prevented from clogging, and are delivered with regularity into the mill by the flanges on the force-feed spindle. The corn is caught by four vertical wheels covered with small teeth, termed little pickers, which revolve about 600 times a minute. Two large picker-wheels hold the corn to its place, with the aid of upright springs, whilst the bevel runners strip the corn from the cob. These runners have coarse ribs radiating from the centre; they revolve 700 times a minute and are very efficient. The cobs are thrown out on to the wire elevator D, and delivered clear of the machine. This elevator is made in two parts, the second portion being at a lower elevation; this allows of any loose grains that may have escaped with the cobs dropping upon an inclined board and passing back to the winnower. The corn falls on a riddle, is winnowed and elevated to the spout, from which it can be delivered into sacks or waggon as desired. This machine is admirably made, and capable of shelling 150 bushels in an hour; a cob-stacker similar in principle to a straw-elevator can be attached at a cost of 25 dollars; without this the price of a 4-horse machine with 10-foot elevator, is 215 dollars; under 40*l.*

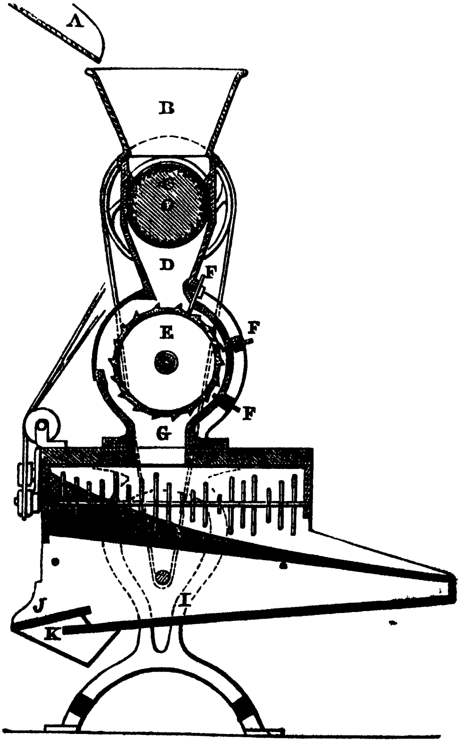
Fig. 53.—*Adams' Patent Corn-sheller.*



Cotton-gins.—Several of these machines were exhibited, made principally in Eastern and Northern States. The cotton is separated from the seed by the action of a series of rapidly revolving saws, working between ribs. The cotton is fed into the hopper, at the bottom of which the saws are revolving; great care is required to prevent accidents, hence a great advantage in self-feeders, of which two kinds were shown. *Hall's Self-Feeder* is probably the original; it consists of a large hopper, with four wooden rollers, placed on an incline at the bottom, with spaces between which allow dirt, &c., to escape. As these rollers revolve, they carry the cotton to one end, whence it passes round a wooden roller with numerous bars carrying spiked teeth. As the roller is surrounded by a fine wire frame, it follows that any dust, &c., is again separated. The cotton is thus dropped with regularity on to the cutters without clogging or requiring manual assistance. Behind the saws is a revolving brush, which collects the cotton from the teeth of the saws, and passes it on to the condenser. It will be understood that the seed is separated by the saws and passes out of the machine at once. The brush, which is of considerable diameter, revolves very rapidly; and in the absence of the condenser, which is not universally applied, the cotton leaves the machine in a cloud of small particles. The best description of condenser comprises a large slowly-revolving cylinder covered with perforated zinc, and a small wooden or iron roller working against it above. The cotton passing slowly between the two is condensed, and delivered almost in a continuous pile, whilst dust passes away by the perforations in the cylinder. Such is an ordinary cotton-gin, and it is a very complete machine. Various sizes are made according to the number of saws, these vary from thirty to eighty. The form is compact. The second description of feeder was shown in connection with *Brown's Cotton-gin* (New London, Connecticut); it only differs from Hall's inasmuch as the four wooden rollers are replaced by a series of fixed and movable bars with iron serrated teeth, which carry the cotton regularly on to the revolving spiked feeder, whence it is delivered to the saws as in the other case. The greatest divergence from the ordinary type of machine, was Scattergood's *Needle Cotton-gin*, manufactured by the Remington Agricultural Company, Illinois, New York, in which the ordinary saws are replaced by circular frames carrying needle-points. These are made of the best steel wire with rounded surfaces; they are made in small sections which can be easily replaced, and being covered with babbit-metal there is no danger of heating, which is a source of anxiety in ordinarily constructed machines. The ribs between the needle circles are peculiar in form, and have slightly chilled surfaces. The merit of this machine is that it pulls the fibre from the seed and does not cut or tear it off, consequently the quality of the cotton is better; that it produces a greater percentage of lint by cleaning the seeds more perfectly, and does more work in a given time than a saw-gin. The brush is made in parts and can be easily repaired. It is not made with a self-feeder, which, however, might be easily added, but there is not the same risk of serious accidents with the needle-points as with the serrated-saw teeth. The sizes vary from 30 to 60 circles, and the price, with condenser, from 237 to 420 dollars.

My readers will be interested to learn some particulars about the machinery for removing the shell and cotton from the cotton-seed, which operation results in an article of cattle-food increasingly appreciated, viz., decorticated cotton-seed cake. Although this trade is a large and extending one, there was only one exhibitor of such machinery, Mr. David Kahnweiler, of 120, Centre Street, New York, who showed several different sized machines. That which I shall endeavour to describe is known as the Plantation Huller: a two horse-power machine, specially designed to supply a very useful position on plantations where hitherto the cotton-seed has been supplied to the cattle just as it comes from the gin, with shell and cotton, much to the injury of the animals. Indeed if such indigestible matter is passed through the system, little nourishment can be obtained from the food, as the shell would resist the most powerful digestion.

Fig. 54.—*Section of David Kahnweiler's Corn-Seed Shelling Machine.*



The annexed illustration (Fig. 54), showing a section of the machine, will enable the reader to understand the mechanism.

The feed-roller C is of cast iron in small sections, the surface is toothed or ribbed, and its action consists in passing the seed down into the mill with regularity, and in arresting the passage of stones, nails, or other substances likely to injure the machine. These foreign matters become wedged between the feed-roller and the hopper, and cause the belt, which drives the roller, to slip, until the obstruction is removed. The seed, after passing the feed-roller, passes by the shoot D to the mill proper—which comprises a hulling-wheel, E, and certain adjustable knives, F, F, F, in the concave shell. The wheel is made of notched and ribbed sections, and it is due to the action of this surface in rapid revolution, in conjunction with the fixed knives, that the shell is removed. The sections are so arranged on the surface of the wheel, as to act like a screw; they can be regulated to compensate for wear. The shell and seed fall through the passage G, on to a fine reciprocating screen, above which is a revolving spindle, furnished with wooden teeth: these teeth keep the mass thoroughly stirred, separate the seed which passes through the screen, whilst the shells and cotton are ejected from the end of the shoe. The hulled seed is then received into the box screen I, which, being shaken by suitable mechanism, separates the still remaining light portion of the hulls that have passed through the meshes of the wire screen, and carries these portions out over the apron J, while the cleansed seed passes through the opening K. This machine, which is capable of hulling from 15 to 20 bushels an hour, costs 150 dollars, retail 27*l.* 10*s.*

Winnowers.—In the French section, Monsieur Joseph Pernollet showed revolving screens both for grading corn, and for removing cockle-seeds, the former by having the screen divided into sections with different sized openings, and the latter by an ingenious arrangement of the internal surface which is indented with round holes of such size as to hold the cockle-seeds, which are thus carried round, until they fall by gravitation into a curtain, and from thence by an Archimedean screw are delivered at the end, the grain coming out below. This is not a new device, indeed, so old is it that I believe the original patent has lapsed, and a similar machine was shown by German exhibitors, Mayer and Co.; but whereas M. Pernollet's machine comprises simply a hopper and revolving screen, the latter driven by gearing, Messrs. Mayes and Co.'s designs are more ambitious, including a separator, winnower, reciprocating screen and a force-feed. The revolving screen is driven by strap-gear. The construction is decidedly inferior to the French machine. The Americans retain the old form of box winnower, some of the best machines having very efficient arrangements for the separation of weeds and the grading of the corn. This is the more necessary inasmuch as the most complete threshing-machine has only a single winnower, and there is scant opportunity for the separation of weed-seeds, in the rapid passage of the corn after it has been winnowed to its exit from the machine. The Queen of the Harvest Company, West Chazy, New York, provide an excellent winnower, which is described as the *Queen of the Harvest Grain and Seed Separator and Grader.* This has a detachable hopper or feeder, which can be actuated by a lateral smooth or trembling motion, according as smooth rollers or cogs are inserted. The feeder can be raised or lowered; it has two screens, one above the other, the first with coarse holes lets the wheat through, and grades larger material. This is useful in the event of dirt or stones, pieces of wood, &c., being present. The sieves, which are numerous and of great range, are made of steel wire sewed on by hand. The screen frame has a trembling motion similar to the feeder, and due to the same mechanism, viz., a rack on the underside working in a friction cog-wheel. The angle of the sieves can be altered. A mixture of wheat, oats, barley and seeds was operated on, and a successful division made. The price varies from 35 to 75 dollars, according to the number and grade of the sieves. Barnard Corticle, of Norwalk, Ohio, also showed a good winnower. The shoe is hung on steel springs, and has a good shaking motion. This is both a fan and a screen. The fan has six blades; the wind space is regulated by slide boards; the shake is controllable; upright teeth in the bottom of the hopper assist the feed. The grain first falls on an auxiliary screen, of very fine mesh, which removes small seeds before the grain is winnowed. This is a well-made and efficient machine.

MACHINERY APPLICABLE TO FARM ECONOMY.

Portable and Stationary Engines.—In this department England was represented by Messrs. Davey, Paxman and Co., of Colchester, with their portable 8 horse-power engine, which made such a good trial at Cardiff in 1872, and their equally good vertical engine and boiler; neither of them was tested. I believe from the trials that were made of some few American engines, that they would have maintained our reputation for this class of machinery; some opinion may be formed by a comparison of results as published. At Cardiff, the portable engine, running at 80 lbs. pressure, 115 revolutions per minute, and doing 13·66 horse-power duty on the brake, ran 4 hours 20 minutes actual time, consuming 2·85 lbs. of coal per horse-power, and evaporating 11·02 lbs. of water for each pound of coal consumed. At the trial of engines at the Cincinnati Industrial Exhibition in 1875, the engine of the *Lane and Bodley Company*, Cincinnati, which stood before four others, and made what was considered an extraordinary result, consumed 14·583 lbs. of combustible (best hickory wood) per indicated horse-power, equal to 6·562 lbs. of coal. Of course as the conditions were different, the comparison is only approximate, but as far as it goes it is in favour of the English invention; and I believe, from what I saw, that makers of portable engines in the States have aimed at producing machinery easy of transportation and reasonable in price, without much regard to the question of economy of fuel. In other words, the boiler and fire-box capacity are insufficient to produce the most economical results. Practical considerations have doubtless influenced the line that has been followed; but it is worth consideration whether more attention should not be paid to the economy of fuel, especially in the Eastern States, where coals are expensive. As most of the work of portable engines occurs during the winter, when the temperature is often very low, I think it would be desirable if the cylinder and boiler were felted and lagged, a precaution which at present is very exceptional. Considering the small value attaching to straw in the Western States, where fuel is often both scarce and expensive, I am surprised that makers have not turned their attention to the construction of straw-burning engines, which have been brought to such perfection by some of our firms. Another point that strikes an Englishman is the absence of traction power. Why should not a traction farm-engine be designed less cumbersome and costly than Aveling's engines and yet capable of hauling loads, threshing grain, and eventually drawing or driving the reaping-machine, and being utilised for steam cultivation when the time arrives, as assuredly it will for such work. The Americans have the best materials at command; they can unite strength with lightness, and by using steel for fire-box and boiler, the difficulty as to weight might be overcome. A trial was organised and carried out at Schencks Station on the 19th to 22nd of July, but only a few engines were sent. A blower (known as Baker's) and made by Wilbraham Brothers, of Philadelphia, was used as the testing power. Each engine drove the blower with a given quantity of coal and wood. The water consumed, time of experiment, pressure of steam, revolutions of blower, and force exerted, as shown by a mercury pressure gauge, were carefully noted and formed the elements of comparison, which were not designed to be absolute but only comparative. A brief description of some of the more noticeable inventions may be interesting.

Messrs. Frick and Co., Waynesboro, Pa., headed the list with their Eclipse Engine, a strong well-made machine, mounted on powerful wheels. The boiler is suspended on springs for travelling, which are let down for work. It has thirty-three 2-inch tubes six feet long: a brake on the hind wheels is not only useful for travelling, but helps to stay the hind wheels when the engine is at work. The engine lies on the top of the boiler, supported on a powerful bed-plate, with a receptacle for waste oil. It is so constructed that it can be readily detached from the brackets, and used as a fixed horizontal engine. The governor has three speeds, and the crank-shaft is counter-balanced, all journals are self-oiling. The saddle has provision for varying expansion. The water-heater is large, of the ordinary diaphragm form, and the pump with air chamber, has a double valve returning any excess of water to the supply. The cylinder has balanced slide-valves, and the safety-valve works by a spring, which is a good arrangement, particularly for rough roads.

The Best Steam Engine and Boiler Works Co., of Lancashire, Pa., showed a useful farmer's engine with some novel and desirable features. The pillar blocks are on one saddle, which is bolted on one side to the bed-plate. The feed-water pipe of the pumps passes through the pillar block journals, and so prevents or checks heating. The pump has a double valve, so that when water is shut out from the boiler, it can go into the ash-pan. The eccentric is reversed without a link motion. The connecting-rod has solid ends. The boxes are set up by a key adjusted by set screws. The water-heater consists of a long narrow tube, with a coil of pipes inside, the steam passing through the centre of the coil.

Lilpop, Raw, and Lowenstein, of Warsaw, exhibited a threshing-machine and portable engine with vertical boiler. The Judges expressed a strong wish to see both machines tested, and, accordingly, after some diplomatic delay, an order was given for their removal to Schencks Station. The engine is very strongly made, a superfluity of iron being used in the frame. It is intended for a country where roads are bad, and skilled mechanics scarce. The arrangement of parts is anything but convenient. Thus the vertical boiler is carried immediately over the front wheels. The cylinder, which occupies an inclined position, is placed at the greatest possible distance from the fire-box, consequently, the engineer has quite a journey to perform between the two. I see no reason why the engine should not be vertical and attached to the boiler. The pump was particularly defective, and this, and the ignorance of those in charge, caused serious delay as well as risk of accidents. The boiler, which is large, contains fifty-two pipes which hang down from the dome, and are so arranged that a large heating surface is secured. On trial, steam was raised in at least one-third less time than in any other engine, and the results were good; this engine taking second place for efficiency.

Wind-Engines are much more extensively used in the States than here, and particularly are they valuable for pumping purposes, many of the railway companies making use of this power to supply their reservoirs. In certain situations, such as the open prairie for instance, where more or less wind is a constant element, Wind-Engines may be used for other work besides pumping, such as grinding, chaff-cutting, &c. As storms are often severe, it is necessary that the engines should be strongly constructed and so designed as to relieve themselves from the force of the blast as rapidly as possible. Hence there is much ingenuity of design and excellence of workmanship. Some of these machines were shown as models in the hall, but three of the more important were erected in the grounds, and to these I shall chiefly direct attention.

Halladay's Patent Wind-Mills, manufactured by the United States Wind-Engine and Pump Company, Batavia, Illinois, are made of various sizes, from one-man to 45-horse power. The Rosette principle is adopted, but instead of being solid, there are a number of sections on transverse axes. These are held straight to the wind during work by means of a balance lever weight behind the mill. When the wind increases, the centrifugal force overcomes the weight. The sections fly open and present their edges to the wind, and

Fig. 55.—*Halladay's Patent Wind-Mill in Work.*

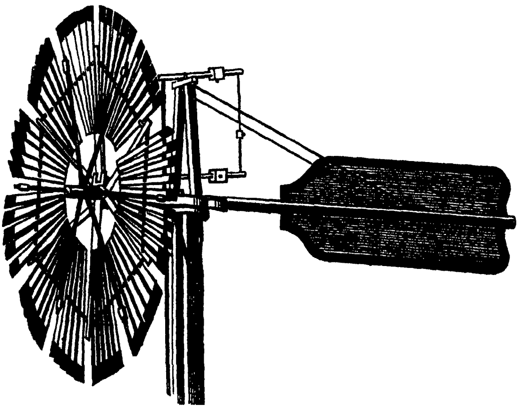


Fig. 56.—*Halladay's Patent Wind-Mill stopped by a gale.*

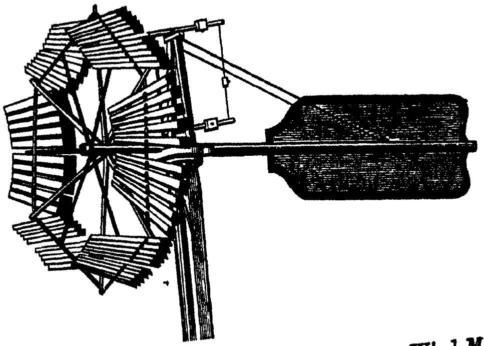
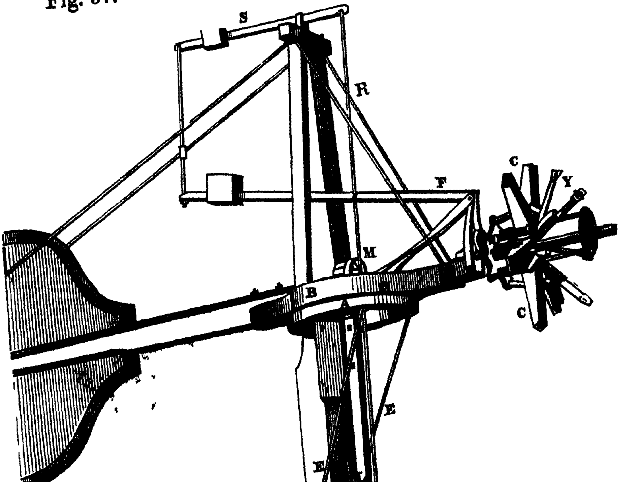


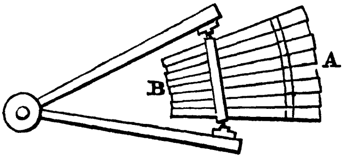
Fig. 57.—*Mechanism of Halladay's Patent Wind-Mill.*



the mill is stopped or checked; but so soon as the velocity decreases the balance weight comes into play again, the sections assume their original position, or at least catch some of the wind, and the consequence of this self-regulation is that this mill works steadily in a comparatively high wind, when other mills have to be stopped. The foregoing illustrations (Figs. 55 and 56) show the appearance of the mill at work and when stopped by a gale. The construction of the engine will be better understood from the preceding illustration (Fig. 57) and the following particulars, which are given in the descriptive catalogue.

A, is a strong casting, bolted to the timber, and further stayed by two braces E, E. The turntable B is large, has friction side rollers and is carried on four friction-balls; this allows of freedom of motion according to the state of the wind. C is the spider to which the arms or spokes of the wind-wheel are bolted. This spider is firmly keyed to the shaft which rotates in babbit-lined boxes on the turntable. This shaft terminates at the centre of the turntable, carrying the crank-plate M, to which is attached the pitman L, which operates the pump. The sliding-head D is connected to the elbows Y by a link from each. To the outer end of the elbows Y, are attached rods which are attached to the centre of each wing, and have a small balance weight behind this attachment, operating out or into the wind, as the lever F is raised or depressed. The action is the same as that of the governor on an ordinary steam engine. By means of rod R and lever S the mill can be stopped from below; when the force of the wind increases the revolutions, the centrifugal force, as has been said before, overcomes the resistance, owing to dead weight, and the sections fly open. This will be better understood by the subjoined sketch, which represents a section of the rosette as at work (Fig. 58). The side of the sail A has a greater area than B, hence a sudden dash of gusty wind turns the sails out of the wind by pressure on A. Just on the same plan as a weather-cock. It is a curious fact that in small mills the wings being all of wood, the outer part being broader and heavier than the inner, it will get up too rapid motion, and the remedy is an iron weight on B; whereas in larger mills of 20 feet diameter, for example, the pace is too slow, and the weights must be hung on the broad outer wheel at A. The explanation of this is that centrifugal force is so great in small wheels that it overcomes the direct pressure of wind against the wing, and in larger circles centrifugal force is so much less that it will not without extra assistance prevent the wind from blowing the wings out of the wind. These mills are sensitive, and probably do more duty for a given wind than some others. The drawbacks are the complication of parts, requiring more attention in oiling, and the additional cost.

Fig. 58.—*Section of a Rosette at work.*



The *Eclipse Wind-Mill Company*, of Belvit, Wisconsin, manufacture Wheler's Patent Wind-Engines, which have a perfectly solid rosette wheel and are otherwise simple in construction. The peculiarity consists in an adjustable inside vane, which acts as an overbalance, and draws the rosette away from the wind, bringing it, in the case of a very heavy storm, nearly in the same line as the back vane. It is claimed that by this arrangement the wheel is always—*i. e.* in a moderate breeze—kept facing the wind, because the action of the vane to draw the rosette away, must first overcome the leverage of a weighted arm, the weight on the same being adjustable. The engine can be quickly stopped by pulling down the lever, which brings the wheel edge to wind. The turntable travels on four friction-balls, running on a grooved surface. The table casting is in one piece with the cap or bed-plate, and has flanges on the under-side, which receive the head of the post. All the parts are numbered, and can be readily fitted together. This appeared to me a simple well-made wind-engine.

E. Stover and Brothers, Freeport, Illinois, also employ the solid rosette. The wheel being dished inwards, and strongly supported by the felloes, which are round. A balance-weight on the left side of the wheel is employed to keep the mill face to wind: when the force of the gale overcomes this weight, the mill is brought edge to wind, and stops. The frame is constructed of four pieces of timber, bolted together like a camp-stool. The turn-table sets on an anti-friction table with 16 chilled-iron balls. The delicacy of motion thus secured allows of a comparatively short vane being used.

The vane-bearer has a spring clutch acting on the crank-wheel, stopping the motion immediately if required. The shaft casting is made in two parts, with india-rubber between to compensate for wear. This mill appears well made, and suitable for a farmer's work.

The last engine I shall allude to is that of *Gammon and Dering*, Chicago, of which a small specimen was shown inside the building. The rosette is in six sections, actuated by a spring and leverage, which cause the fans to open. The stroke is made also to vary with the force of the wind. This is effected by having the crank-shaft bent, and acted on by a spring on the rosette standard; when the wind is strong, the crank is forced back and the stroke is lengthened. The connecting-rod is attached to the crank by a ball-and-socket adjustment.

This is ingenious, but, as the action depends upon the rigidity of a spring, I should be afraid on the score of durability.

Chaff-Cutters, Pulpers, &c.—I was not surprised to find that this class of machinery was less advanced than some others. In the Western States, especially, very little has as yet been done in the way of food preparation; manure has hitherto been an incumbrance, and the scarcity of labour has precluded that attention to cattle-feeding, which hereafter will be found remunerative. In the State of Pennsylvania I inspected one farm near Harrisburg, comprising about 1200 acres, on which the whole of the corn stalks were chopped up and then steamed for cattle-food—and, what is more to the point, the whole of the grain was ground up and given to fatting-cattle and pigs.

Of the few Chaffers exhibited by the Americans, I liked best those of Messrs. Silver and Denning, Salem, Ohio, which have a good safety arrangement in case stones or pieces of iron get into the box. In common with most of the American choppers, the knives are not fixed on the fly-wheel, but are attached to the shaft by means of projecting arms, the fly-wheel being placed at the end of the shaft. The attachment is by means of a friction-cone; when any foreign substance comes in contact with the knife, the latter is checked and almost instantly stopped, whilst the fly-wheel continues to revolve. The throat-piece is concave, and the cut is made in a slanting direction. The upper roller has 3 inches play, rising accurately on both sides by means of racks, and thus securing great capacity. The mode of altering the size of cut by shifting a cluster of gear-wheels is ingenious and convenient. The lower roller is smooth, the upper one ribbed. The medium-sized machines are fitted with two knives, and can be readily adjusted to cut ½, ¾, or 1¼ inch chaff. Whereas the largest machines with four knives will cut ⅛, ⅜, and ⅝ inch in length, without the removal of any of the gear-wheels, or the substitution of others. The knives are shielded by a cover; and the larger machines are very efficient. The knives require to be sharpened once a day.

The Canadians are decidedly ahead in this description of machinery. *Mr. John Watson*, of Ayr, Ontario, whose general collection of useful implements merits recognition, exhibited several chaff-cutters constructed upon the

English model with certain modifications. First, I have to notice a power machine with Crowley's arrangement of gearing, and Richmond and Chandler's knives; this cuts six different lengths, from ½ to 2 inches; by clutch-gearing on the first and second motion shafts, three changes are effected; the rest by changing the pinions. The gearing is carefully boxed off. Mouth-piece of steel. The same firm exhibit Toulton's combined Pea-cleaner and Pneumatic Chaff-carrier, an ingenious combination by which the peas are separated from the pods without being so much broken as by the drum of a threshing-machine. The haulm is cut into chaff; the latter is separated from the peas and blown up the carrier to a considerable distance, whilst the peas are collected below. The retail price of the apparatus is 18*l.* In the Pneumatic Chaff-cutter, also shown by Mr. Watson, the fly-wheel, in addition to the knives, has four wooden blades standing out at right-angles, which generate sufficient wind to blow the chaff through a tube for a considerable distance. The air enters under the box. The defect in this machine is that the handle of the clutch, by which the machine is stopped, is on the right-hand side of the box at the extreme end of the pinion shaft, and quite beyond the reach of the feeder in case of accident. There is no protection of any kind, and unless the Canadians are much more careful than Englishmen, serious accidents must occur. In no machine did I find the revolving wooden roller in front of the feed-rollers, which we think should never be absent.

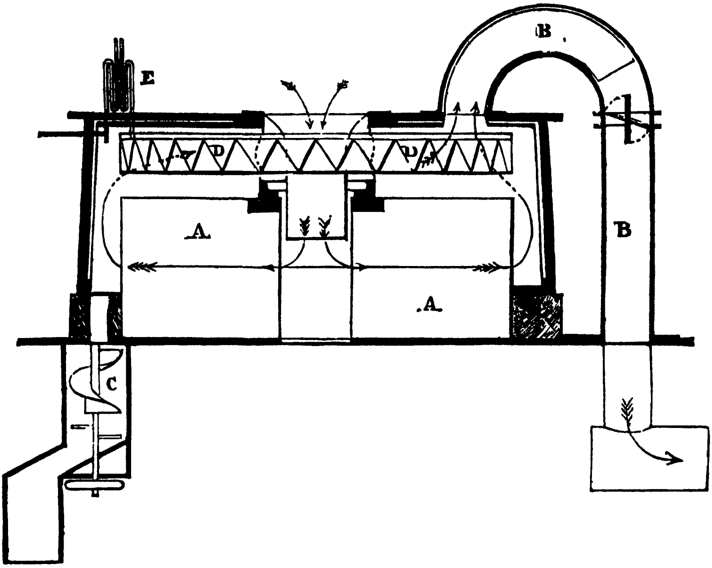
David Maxwell, of Paris, Ontario, is the inventor of a power Chaff-cutter with patent gearing, by which the rollers can be stopped, reversed, and size of cut changed without the use of a clutch or change of wheels. Thus Mr. Maxwell secures the ability to stop, reverse, and change cut, without clutch-gear or change of pinions. A further alteration of the size of cut can be effected by reversing a pinion on the second-motion shaft. The face of the jaw is chilled cast iron; the feed-rollers are not affected by opening of jaws, as the upper shaft has play. This is a powerful and well-made machine, with fairly good provisions for safety.

Mr. A. Anderson, of London, Ontario, exhibited an admirable hand-cutter, without wheel or gearing. The blade is attached to a wooden handle, the other end terminating in a pin, which travels up and down in a slot. It is of diagonal form, with ragged edges. The length of cut is regulated by a feed-board attached to the above-mentioned pin at the lower end, and having the necessary play by means of a slot and bolt attached to the frame. An india-rubber tension-spring steadies the cut. For simplicity, efficiency, and reasonable cost, this invention is worthy of high praise. Several thousands were sold during the Exhibition; the retail price was nine dollars, Canadian money. The same exhibitor showed a clever bread-knife and hay-cutter, with similarly constructed blades.

The only exhibits of Slicers and Pulpers for preparing roots for animal food were shown by Mr. John Watson. His Triple-action Pulper, Ribbon Cutter, and Slicer, is a valuable combination, comprising two discs revolving on the same shaft, one furnished with pulping-blades, the other with slicing and ribbon knives. The hopper is in two parts, with a hinged plate to cover over either portion as desired. The pulping-knives can be brought forward or backward so as to regulate the size of the pulp. The Gardner's Cutter and Slicer is an improvement on the well-known English machine. It has a sliding division-plate or hopper, which insures the roots being continuously presented to the cutting surface.

Corn Mills.—Messrs. Jaacks and Behrns, of Lübeck, exhibited a model of millstones with their patent aspirator, of which the following sketch and description will afford some idea.

Fig. 59.—*Messrs. Jaacks and Behrns' Patent Aspirator.*



A A. Mill stones B Exhaust. C Flour vent.
D D. Flannel curtains E. Vacuum metre.

The object of the patentees is to obtain a thorough current of air between the stones, and at the same time to remove all moisture. The air, as will be seen by the direction of the arrows, enters from above, and, after circulating between the stones A A, is exhausted in the tube B. The flour is forced out on the opposite side by an endless screw, C, with a valve-mouth, so that no air can possibly enter. In order to prevent the flour passing into the exhaust, as it would inevitably do from the force of the current, the whole of the upper inner circumference is hung with triangular-shaped surfaces of flannel, on which the flour accumulates, and from which it is occasionally detached by an automatic vibration communicated to the flannel. The case surrounding the stones consists of wood and felt, lined with tin, which prevents moisture condensing, a matter of great importance.

In the French department, *Du Vivier and Co.* exhibited a novelty in the Aubin Bolting Mill Stones. This consists in the lower stone having spaces from the circumference to the centre, occupied with metal bolting-sieves, which are agitated by knockers. The flour passes through the sieves, and is collected below, whilst the bran escapes through openings between the stones.

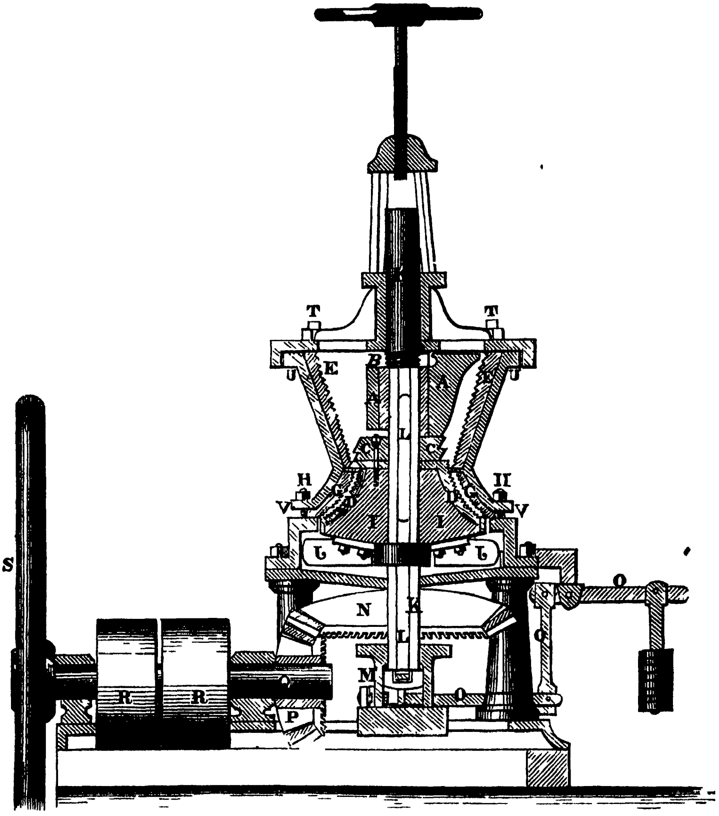
In the American section were several exhibits of metal mills, which were generally meritorious, both on account of material used and efficiency of operation. *Messrs. Sedgebeer and Miller*, Ohio, in their Nonpareil Farmer's-feed and Corn-Mill, have a very useful machine. The runner is a vertical disc-wheel, covered with Y-shaped projections; the lower part of each tooth in its row connecting with the upper part of the next below; by this arrangement, and the shape of the teeth, the meal is forced as well as ground toward the discharging edges. The teeth are raised over an eighth of an inch from the plane of the plates, and are of the hardest grey iron, consequently very durable. This is a self-sharpening mill, one side of the teeth are being sharpened when the others are in work, consequently, all that is necessary to obtain a fresh cutting-surface is to reverse the motion. The frame is cast in one piece, giving strength and steadiness to the mill. The plates can be readily renewed, and cost seven dollars each. The shaft of the grinding-plate has a cob-crusher, which runs in a strong cast-iron box or square tube. The inclination of the jaws of the crusher, being twice as wide in front as in rear, serves also as a conductor, to convey, with great force, all substances or grain into the plates. These jaws are of great value in dealing with Indian corn in the cob, for which they were designed. The mill has a neat appearance. The runner is driven about 2000 revolutions per minute.

W. L. Boyer and Brothers, Philadelphia, make a strong conical mill, in which both the runner and concave have raised fluted sections, consequently the edges sharpen themselves when brought into contact. This mill also has a cob-breaker, the cobs being fed in from an opening in the cover. In one example a bolting machine was attached underneath for making family flour. The same jigger from the pulley-wheel acts on the hopper above and the screen below. The cone and concave, which latter is a part of the box, are of cast steel. The mill is adjusted by set screws at the end.

Though more suitable for crushing bones, coprolites, &c., than corn, I must not pass on without noticing the very powerful sectional mills shown by *Baugh and Sons*, Philadelphia, of which I am enabled to present my readers with a view in section (Fig. 60, p. 74), which, with the description, will explain the mechanism.

A is the top-breaker, with a projecting arm, which is varied in shape to suit different materials. It is made to slip over a sleeve, which fits snugly on the shaft, thus protecting the latter and reducing the weight of iron that has to be renewed when a new breaker is necessary. The screw-nut B holds the breaker in position; C is the circular grinder, with holes for stud-bolts, one of which is seen, used to tighten the grinding sections D; E is the stationary sectional drum, or concave, eight of which form a circle. The corrugations are very deep, so as to provide for much wear. D, D are the full sections attached to the cone I. The stationary sections G are held in place by nuts, H; both the surfaces D and G admit of a great deal of wear. These are the true grinding parts; all before has been in the nature of breakers reducing the material gradually. The cone, I, has a heavy wrought-iron band round the base to support it, and is held in place by two projections, L, L, on the shaft, and a tight collar below. The ground material is carried to the spouts by the wipers J, J. K is the main shaft of wrought iron, 4 ft. 6 in. long, by 5 in. diameter; the lower end, which works in the step, being of solid steel. A steel conical anti-frictional disc is placed under the shaft, and prevents it heating. The step-box, which has a steel lining, is movable; the step moves up and down in a hollow column, M, inclosing or opening the mill to adjust the grinding; the shaft working freely through the cog-wheel N, which is supported by M. A lever for adjusting the mill with weights is shown at O. P is the driving cog-wheel. Q is a wrought-iron counter-shaft, 3½ in. diameter, on which are attached the fixed and loose pulleys R, R, 22 in. diameter and 10 inches face. The large screw at the top of the mill is used for raising the different parts to change the sections. In order to change the upper sections, the bolts T are loosened, allowing the mill to be opened at U. To change the lower grinding-surface, the bolts H are unscrewed, allowing the mill to be opened

Fig. 60.—*Baugh and Sons' Sectional Mill.*



at V, then the large nut B is loosened, and the breaker and sleeve are raised. Next, the stud-bolts passing through C are unscrewed, when all the grinding surfaces can be removed. The strength and simplicity of arrangement will be evident from the above description.

MACHINERY FOR TILLAGE.

Ploughs.—To an Englishman, the novelty in this department is in the Gang and Sulky Ploughs, *i.e.*, double and single furrow ploughs attached to a frame mounted on high wheels, with a seat for the driver in the centre, the animals drawing from a pole. The use of such implements is principally confined to the Western States, where the size of the occupations, and the long distances to and from home, render such appliances desirable. Without these inventions, it is probable that during and after the war much of the land could not have been cultivated. At the former period it was no unusual sight to see a team driven by a daughter of the house; and after the peace, maimed soldiers were competent for such work, which would otherwise have required able-bodied men. Nor do I think that the weight of the carriage and driver adds materially to the draught. The wheels are large, and the ploughs are suspended from the beams. The friction is to a great extent rolling rather than sliding, and might be entirely so if inventors would copy the English double ploughs, and replace the sole, &c., by a friction-wheel behind the mould-board. One of the Judges (Mr. Bruce, of Carvallos, Oregon) informed me that with two of these ploughs, each drawn by four mules, he and his servant did all the ploughing on a farm of 600 acres arable during the winter season, averaging about fifty acres per week. When on the road, or during the turning at the headlands, the ploughs are raised clear of the ground, and the team, driven with reins, trot along at the rate of six miles an hour—an important consideration when the occupation is large, as on one particular prairie farm, on which it is said a furrow twelve miles long can be drawn. A word or two touching mules, which are so largely used, not only for agricultural, but for town work throughout the States. If a proof of their value were needed, it would be found in the fact, that in ordinary times, *i.e.*, when trade is flourishing, their price is double that of horses; 40*l.* to 50*l.* is quite a common figure for a 4- or 5-year-old mule. I visited one of the best-managed farms in Pennsylvania, that of Mr. James Young, of Middleton, near Harrisburg, and found twenty-four mules doing the work of the farm (about 1000 acres, nearly all arable), the only horse kept being the nag for the overseer. Mr. Young's practice is to buy them in at three years old. At the time of my visit the price was only 27*l.* 10*s.* to 30*l*; they are usually worked till fourteen or fifteen years old, when they are exchanged for youngsters, making about 10*l.* or 12*l.* Many of them were very powerful, between sixteen and seventeen hands, capable of great endurance and long hours when well fed. As far as I could learn, a mule may exist upon less than a horse; but in order to get maximum work, they must have good food, and plenty of it. The principal difference in treatment is that the mule requires more hay and less corn. The following is the diet at Middletown:—4 A.M., a feed of whole cobs, just as much as can be eaten up clean; at noon, a feed of bruised oats; at night, cut hay, with mash composed of rye, oats, and corn; average consumption per day, corn 12 lbs., hay 15 to 16 lbs.: this would be good feeding for a farm-horse. Nothing was more noticeable during the great heat in Philadelphia than the miserably jaded appearance of the tram-car horses, numbers of them dying, often actually in harness (one of the best-managed companies, that running through Chestnut and Walnut streets, lost in thirty days over 100 horses); whilst the mules, presenting a sleek, well-fed appearance, trotted along with their loads without turning a hair, and, however hot the weather, appeared always full of life. They are not considered either fast or heavy enough for the cars; but for light waggons they answer admirably, and much of the goods traffic is done by these patient animals. Mr. Young considers mules very superior to horses for endurance, and especially adapted to a hot climate. But even mules require attention, and the master's eye is of great value in seeing the first signs of fatigue. I was told that on many occasions during the last summer it had been necessary to take them out of harness, place them under shelter, and apply water to the head, although they are much less liable to sunstroke than horses. Considering the great value of mules, as evidenced by their employment for both manufacturing and agricultural purposes, I was surprised to learn that they were not recognised in the Philadelphia live-stock show, or, if prizes were offered, there was no competition.

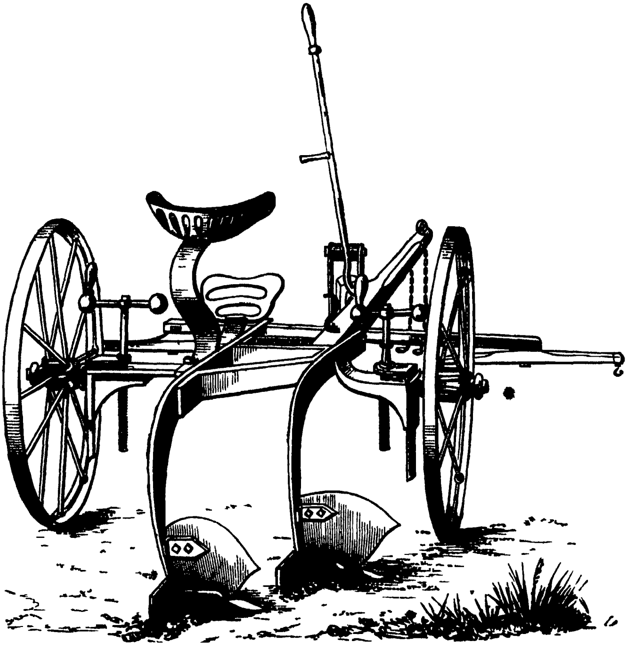
The first example of a Gang Plough I shall give is that made by *Messrs. Deere and Co.*, Moline, Illinois, a leading firm in the West, whose exhibit at Philadelphia was very complete in this department. The chief point in this implement is simplicity. The plough is operated by one lever, the handle of which is on the left-hand side of the driver. The wheels are of uniform diameter; their relative position is obtained by the axles being differently cranked; both the pole and the beams are attached to the main axle, and the latter are extended behind the wheels. I may here remark that the American mould-boards are much shorter, more abrupt, and stronger than the English; doubtless because the ground is often much rougher.

The Sulky—*i.e.* one-furrow—plough, made on the same principle, is equally commendable for simplicity, strength, and efficiency. This is operated by one lever only, which is moved into different notches according to the depth required. A disc coulter is used. This is intended for three horses abreast, one on the right-hand side of the pole, two on the left, with compensating whippletrees. This plough is capable of doing good work, being simple in construction and strong in material.

R. D. Buford and Co., of Rock Island, Illinois, exhibited a number of different ploughs, including both double and single-furrows. Their Gang Plough was hardly so simple as the last described; as, in addition to a front lever, used to take the ploughs out of ground, each wheel is hung on a separate axle, which is bolted to the frame and the depth is adjusted by a screw. The beams are very well braced. On the whole, I prefer the construction of the Deere Plough, because the movement of one lever affects both wheels. The mould-boards are made of patent cast steel, thoroughly hardened, and the shares are also of cast steel. Messrs. Buford make an extra strong Gang Plough for the Californian trade. The screws are easily operated, and are very convenient for hillside ploughing.

The same firm make an excellent Sulky Plough, which is entirely of iron, and those parts subject to the most strain are wrought. The beam of the

Fig. 61.—*Back View of Buford's Sulky Plough.*



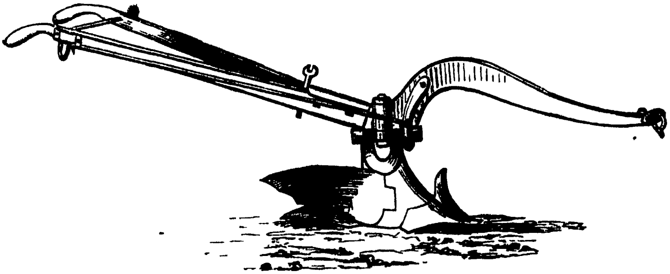
plough is suspended and carried on the frame. It is furnished with two levers, one on each side of the driver, but is operated by the right-hand lever only, the left being used to make the plough run level when opening land and back furrowing, ploughing on hillsides, or varying the depth of furrow. The seat is carried on a strong circular bracket.

Messrs. Collins and Co., Hartford, Connecticut, showed a good Gang Plough, of which the chief features are that the draft is taken from the centre of the machine. It is designed for three horses abreast, one on the right and two on the left of the pole, the draft being regulated by compensating leverage. The frame, which is strongly braced, is carried on a crank-axle. The different and controllable angles of the wheel-arms regulate the respective positions of the land- and furrow-wheels. The frame is of cast iron. The shares and mould-boards are cast steel, with revolving wheel coulters. The wheels, which have wrought-iron tires, are 42 inches diameter. The price is 90 dollars.

Stevens, Foster and Co., Chicago, showed their Rotary Gang Plough, accompanied with a placard, offering to wager it against all comers. The Judges, at the solicitation of the exhibitor, went out to see the implement at work, and were not repaid for their trouble. On land that had been recently ploughed, the soil was well stirred; but on a dry stubble the depth was very unequal, and the bottom left in ridges. This is exactly what I should have anticipated, from the nature of the rotating disc-wheels, which take the place of the ordinary plough. The reader will understand the nature of the implement from the following description. A strong iron frame is supported on two high wheels in front, and one swivel-wheel behind, the latter under the driver's seat. The discs are 3 feet in diameter, fixed on a cross-arch, and the plough can be worked either as a gang or a sulky. In hard soil one disc is taken off. It is quite possible that in soft prairie land this implement may be found of more practical value than was apparent to the Judges.

Messrs. Speer and Sons, of Pittsburg, are the inventors of an admirable hillside plough, which, for simplicity and efficiency combined, is far superior to any of the turnwrest ploughs which have been used in this country. The frame of the plough is in duplicate with a revolving wing. The stilts and beam revolve upon the frame, being pivoted to it by a bolt; a strap attached to the beam, passing over a projecting pin on it, and actuated by a rod from the stilts, holds the beam, &c., in place. When the plough reaches the headland, all that is required is for the workman to push the lever-handle which relieves the strap from the bolt, and the horses draw round the beam. There is great strength, and nothing to get out of order.

Fig. 62.—*Messrs. Speer and Sons' Plough.*



My space forbids details, which might otherwise be interesting, as to varieties of ploughs, which were numerous; but I must very briefly allude to the exhibits of the Oliver Chilled Plough Works, South Bend, Indiana, because the company possess the art of chilling metal ⅛-inch thick uniformly throughout, so that the fibrous nature produces a perfectly uniform surface. It is so dense and compact in grain that it will receive and retain almost as high a polish as a mirror; and rust does not eat into it, because every portion of the surface is equally compact and of uniform hardness all over. The consequence is that the surface is always bright, and these ploughs have a deservedly high character for keeping clean in work. The durability must be great, both on account of the hardness of the material and the substance of the mould-boards.

Canadian exhibitors followed the English model to a great extent, both as to single and double-ploughs. The mould-boards were longer, less abrupt, and of lighter material than those in the American section. The Acton Plough Company, Ontario, exhibited somewhat of a novelty. The beam being much prolonged backwards, in place of the ordinary stilts, is bent at the point where the hind part of the mould-board is attached, which is done to secure a proper balance; the handles are very short. The frame or socket is like the beam, of wrought iron, forged solid, which gives great strength. The coulter-attachment slides by means of an adjustable clip, which allows of the coulter being moved forwards or backwards on the beam and set at any angle. The bent beam secures direct draft. The shoe is, I believe, the only piece of cast metal, the share being of wrought iron, and the mould-board and land-side are steel.

Thomas Yeandle, of Stratford, Ontario, showed a good General Purpose Plough. The share, of wrought iron, has a considerable clearing space underneath; the mould-board takes ground only at the end. The sole is of steel, with ¾ inch on the ground; total width of sole 2½ inches, with 3 bolts. The land-side is so made as to allow of adjustment as the surface wears away; the mould-board is also adjustable. Mr. G. Wilkinson, of Aurora, Canada, showed single, double, and treble-furrowed ploughs.

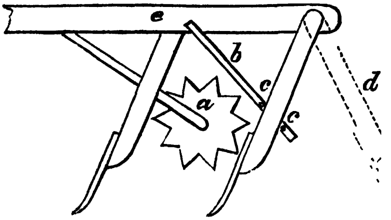
It would be decidely an omission to pass over the contributions of Sweden in this department made by two manufacturers, viz., *E. Klundth, L.P.*, of Hjelmafors, Ulricehaum, and the *Gothenburg Machine Manufacturing Company*, in the examination of which I was ably assisted by the Chief Commissioner, Mr. Dannfelt, whose interesting papers on 'Swedish Dairy Factories' appeared in this Journal for 1870 and 1872. E. Klundth exhibited six ploughs: material excellent, strength great, and price low—11 and 12 dollars each—due to the comparative cheapness of both material and labour. Four of them were for Russia, furnished with vertical friction-wheels behind the land-side, and projecting ¾ of an inch below; so as to take the whole bearings. There was also a small wheel behind the mould-board, the body being cast in one piece with the land-side. Another peculiarity is that the land-side is prolonged, and occupies a space between the share and the mould-board; an arrangement which is considered to give greater strength. The share is of wrought iron, steel laid; mould-board wrought iron; the beam and handles are one piece. The Russian ploughs are made for dry, friable soil. The two remaining exhibits were similar in construction, only without the friction-wheels, the soil of Sweden being generally strong and wet.

The Gothenburg Company showed a large collection of Ploughs. These all had split beams with strong frames; the handles separate from the beam. The form of mould-board, on the old Scotch model, was good; but in general construction these ploughs were not so strong as the first described. The handles were well braced. Eight hundred men are constantly employed by the firm, whose operations are very extensive.

Cultivators and Hoes were shown in great numbers, and of many different forms. The form of the cultivating-blade, however, is pretty uniform, viz., a common steel cutter with pointed ends, which are often made uniform at top and bottom, so as to be reversible. These implements attain their greatest perfection in connection with the cultivation of Indian corn, for which very efficient machinery is required, inasmuch as success depends upon the surface being clean and deeply pulverised. From the period when the hills are visible, and even before the plant breaks ground, if check-rows have been made, the cultivator must be constantly at work, and it is no uncommon thing to see three or four hoes or cultivators at work in the same field. The larger machines are for two horses drawing from a pole.

Messrs. P. P. Mast and Co., of Springfield, Ohio, make an excellent machine, with a shifting seat, to be used either for walking or riding. It is necessary to work the soil close up to the plants, which are guarded from injury by means of shields, which hang down from the frame and travel on the surface of the land. In this case the shields consist of rotating toothed-wheels. Each frame to which the hoe-standards are attached is hung by a chain from the top of an upright standard. The hoe-standards are jointed to the frame, and braced by iron bands passing through the standards, and secured by a wooden pin of soft, breakable material; so that in the event of the hoe coming in contact with a root—by no means an unusual occurrence—the pin gives way; the standard, in consequence of its jointed connection to the frame, flies back, and a serious accident is prevented. I have endeavoured to illustrate this in the annexed sketch (Fig. 63).

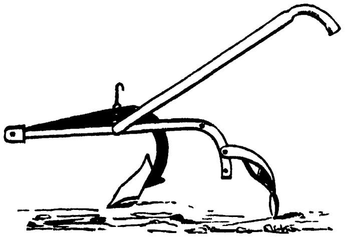
Fig. 63.—*Mast's Walking Cultivator.*



a. Revolving shield.
b. Iron brace, with wooden pegs, *c, c.*
d. Position of hoe and standard when peg is broken.
e. Frame.

Brewster, Dodge, and Huse, Peru City Plough Works, Peru, Illinois, make Walking Cultivators both with iron and wood beams. These are very handy implements of light draft. The distinguishing features are a double or split pole, well secured to the bow of the axle. The standards are attached to the bow of the axle, and have sufficient play. Here we find a different arrangement to prevent breakage. The portion of the standard to which the hoe is fixed is attached to the main arm by, first, a steel pin, and secondly, a little lower down, by a wooden pin. Any violent collision causes the latter to break, and the hoe flies back, as seen in the accompanying drawing (Fig. 64).

Fig. 64.—*Brewster, Dodge, and Huse's Walking Cultivator.*



A good combination of a Cultivator and Broadcast Seeder was shown by Bean, Koft, Jarrett and Co. The standards are split up at the end, so as to form attachments for the harrow teeth, which cover the seed that falls from the box. The standards are attached by chains to the main frame, and have considerable play.

As a specimen of a One-horse Expanding Cultivator I may mention that of *Rogers and Risley.* It is made of iron and steel (except the handles); it has three beams, the central one fixed, the others can be contracted or expanded by loosening a set screw; the hoes, five in number, are made of cast steel with convex surfaces, which keep sharp by wear and tear.

DAIRY FITTINGS AND APPLIANCES.

When it is remembered that America is the home of cheese factories, and disputes with Sweden the introduction of butter factories, I expected to find this department more replete with statistical information than was the case; but, with the exception of some tables as to the produce of the different States, there were no data that I met with giving a history of the rise and progress of this most important industry. The various companies, however, combined together to construct a butter and cheese factory, which was placed on the east of, and near to, the Agricultural Hall. It comprised a main building, 110 feet in length, and 36 feet wide, with two wings each 80 by 32 feet, extending eastward from the main structure. A piazza, 8 feet wide, surrounded three sides of the building. The factory was two storeys high, with attics. It was made of wood, painted in light colours, and combined economy with a pleasing effect. The cost of erection was 20,000 dollars. The object of the Association in making this outlay was to exhibit the processes of butter- and cheese-making in all their stages, to offer a favourable opportunity for the exhibition of every kind of machinery, and to offer facilities for the exhibition of products, as well as to dispose of the material as it was made. Unfortunately, owing to delay in completing the buildings, and to the unusually hot weather which prevailed through most of July, the factory, though fitted up with necessary machinery, was not in actual operation until after I left America.

The only complete exhibit of Cheese-making apparatus was shown by *H. H. Roe and Co.*, of Madison Lake County, Ohio, who I believe supply a large number of the factories; this comprised a small vertical engine and horizontal boiler, suitable for factory use, and, as far as I could judge from appearance, of economical construction, also two very large cheese-vats of parallelogram form. The vats, made of strong block-tin, rest in wooden cases with sufficient space under and on all sides for the necessary supply of water, which is heated by means of steam-pipes with numerous outlets so distributed over the bottom of the case as to insure uniform temperature rapidly acquired. The whey is removed by a syphon. The same firm also exhibited two cheese-vats with heating apparatus attached under the centre, a less costly arrangement but of very inferior utility for the following reasons. The fire raises the temperature of the cheese-room more than is desirable, and the fire space being only in the centre, the water is not so evenly heated as by the introduction of steam. The only other exhibit of a Cheese-making apparatus was shown by *Carl Atterling*, of Orebrö, Sweden, his design being very similar to that used in England for making cheese on the Cheddar system. Steam is used as the heating medium. It comprises a steam generator of economical construction, which can be either in the same room, or farther off if desired. A small steam-pipe conducts to the steam-jacket of a large circular vat composed of copper tinned over. The whey is removed by a stop-cock at the bottom of the vat. In the Swedish department I found a series of well-executed designs of cheese and butter factories from the well-known dairy engineer, William Rehnstrom.

Apparatus for Butter-making was largely shown. The *Compartment Milk Pan Co.* exhibited a series of large block-tin pans of rectangular form, divided into unequal compartments to suit the requirements of the dairy at different seasons; they are contained in zinc or galvanised troughs with water-space all round; an adjustable vent regulates the height of the water: this is an ingenious and useful appliance. I also liked the pans shown by W. B. Allen and Co., Ogdenburg, New York, similar in construction without the compartments, and having a tap and two waste-water pipes for regulating the circulation of water. In both cases the pans were shallow. It is reasonable to suppose that cream rises more rapidly in shallow vessels, but the question has not, I believe, been proved; and there are advocates for the deep-can system who say that the question is not what is the depth of the milk, but how rapidly and completely the temperature can be affected, either reduced in hot weather or raised if necessary in cold weather.

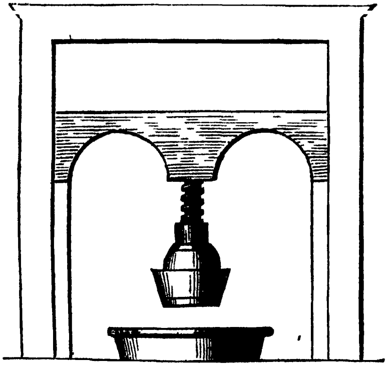
Churns were shown in great variety. No trial was practicable, and therefore I shall only allude to one or two exhibits. It is satisfactory to see that makers have abandoned the idea of making time the chief object of their inventions: very rapid churning is not, as a rule, economical. Another point is that cream may be subjected to too rapid and too violent action, whereby the fatty globules are broken, and the quality and keeping properties of the butter injured. All the power-churns shown were on the old barrel principle with fixed dashers, and, in two at least of the hand-churns, the agitation is secured by the motion of the box itself without the aid of fans, dashers, &c. The Oscillating Churn shown by G. T. Elsworth of Baire, Massachusetts, consists of a square box set on an oscillating table. The crank-shaft, by the revolutions of which the oscillations are secured, is furnished with two fly-wheels about 30 inches diameter which secure steadiness. The action is remarkably steady, and though I had no opportunity of experimenting I formed a very favourable opinion. The box is easily cleaned out.

Messrs. Cornish and Curtis, of Wisconsin, make a Rectangular Churn. The box, which is of ordinary square shape, is set on the frame cross corner wise, and consequently, when made to revolve, an irregular jerky motion is secured; having no dashes, this churn is easily kept clean.

J. Tingley, Philadelphia, exhibited a Barrel Churn on the old dash principle, *i.e.*, the barrel is fixed and the dashers revolve, being put in motion by turning a crank-handle. The peculiarity of this churn is that it is hinged to a standard, supported whilst in action by a movable stay or bracket. The lid, which is at one end, is secured by a contracting band. In order to fill the churn, all that is necessary is to remove the bracket and turn the barrel down. It is also as easily cleaned out.

The improvement in Butter-working machines which was evidenced in several of the exhibits is considerable. I draw attention to a Power and Hand Machine. The former exhibited by P. Shaw of Scituate, Massachusetts, is commendable both for simplicity of construction and efficiency of action. The apparatus comprises a vertical screw-press working in a strong frame, which has an up-and-down motion communicated to it by a crank underneath, which is not seen in the illustration (Fig. 65), and a revolving circular table adjustable by the operator's hand as to position in reference to the press. This table revolves upon and forms the top of the butter-milk receptacle, which is also an ice-box when required. The operator revolves the table in such a manner as to bring every portion of the butter under the action of the worker. The latter is of iron tinned over, with a number of perforations and covered by a cloth, so that any butter-milk squeezed out upwards is absorbed by a sponge. The table is also covered with a cloth in which, when the operation is complete, the butter is removed to the packing department. These machines are made in two sizes, either for working by hand or power. In the former case the

Fig. 65.—*Shaw's Butter-working Machine.*



workman operates a treadle below, but it is as power machines suitable for very large factories that their merit chiefly consists. Power machines cost 150 dollars; hand machines, 35 dollars.

P. Embree and Sons, of West Chester, Pa., are the makers of a Hand Machine which though patented as recently as August, 1875, is already largely used and deservedly popular. I saw it in use at a small factory of 250 cows. The machine is made of three sizes to work 20, 50, or 70 lbs. of butter, and ranges in price from 25 to 45 dollars. We have first a strong tripod frame supporting a revolving cedar-wood table with a convex surface. The butter is placed on this table, and pressed by a revolving conical fluted roller with cleanser attachment actuated by lever handle. At the opposite end of the roller shaft is a small pinion working into toothed-gear in the centre of the table, causing the latter to revolve. The butter is distributed on the convex surface of the table; all that is necessary is to turn the handle, which can be done by a child, and the butter is brought under the action of the roller and thoroughly worked; all liquid expressed finds its way by a channel to an opening in the edge of the table. The roller can be easily detached, and both it and the table readily cleaned.* Price of small machine, 25 dollars.

Next I must notice an improvement in Butter-printing Machines. *Mr. John Matthews*, of Pleasant Grove, Pa., showed in the Dairy Buildings a highly ingenious device in which the box is raised after the butter has been pressed for the removal of the butter-milk, and can be easily detached for cleaning purposes. This is effected by a rack or stand and with a sun-and-planet motion—a very ingenious arrangement.

Speakman, Miles, and Company, of West Chester, also exhibited in the Agricultural Hall a clever design for the same purpose, consisting of a hinged box working down on a movable mould. The press is worked by a spring and lever. I must not omit to notice a Tin Milk-Strainer and Cover, made by the Universal Strainer Company, Rutland, Vermont, which should be universally employed. It comprises a funnel with a conical strainer in its centre, of fine wire-gauze, which again is covered by a movable cap, the sides of which are made of similar wire. Thus the milk is twice strained, first through the cap, and secondly through the cone; and, owing to the form of the latter, any foreign matters are left at the bottom of the funnel instead of being forced through the strainer, as might be the case if the latter were placed at the bottom of the funnel. Next I should notice the exhibits of Milk Cans for transporting milk from the producer to the factory, or for the town trade. The Ironclad Can Company and Messrs. H. H. Roe and Company were the principal exhibitors; the exhibits of both were well made, highly finished, and admirably adapted for the purpose. Lastly I draw attention to Butter Tubs, which were of two kinds. Those shown by I. G. Kochler in the Agricultural Hall are intended for conveying the butter after it has been prepared for the retailer. They are oval in form, made of cedar wood, with convenient movable shelves for packing the butter, and ice receptacles at both ends. The Orange County Pail Company, of New York, show a large exhibit of strong well-made Oak Pails with good fastenings, for carrying butter in bulk.

MISCELLANEOUS.

This large group requires subdivision; and I shall commence with a description of machinery applicable for "*Laying out and*

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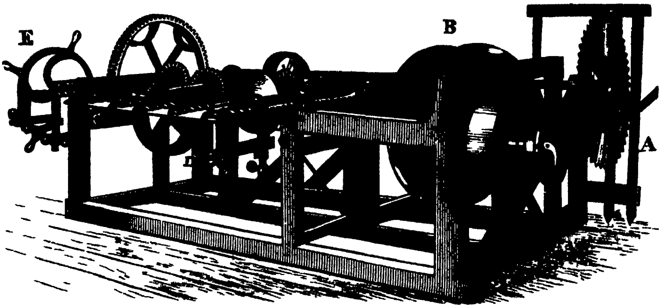
* A similar machine, of American origin, largely used in Sweden and Denmark, was figured in the 'Journal' for 1875, Part I., p. 225.

Improving Farms." My limits, which, I fear, have already extended farther than will be approved of, only permit of a brief notice of some of the more remarkable exhibits. S. W. Hall, of Elmira, New York, showed a Universal Fencing Machine, a most valuable invention, not only rendering the operation of fence-making more rapid and economical, but turning out a more perfect fence than could be made by hand.

Fig. 66.—*Hall and Co.'s Universal Fencing Machine.*



A. Circular saw. B. Reducing and tenoning machine C Augers
D. Screws for holding posts whilst being bored. E. Adjusting-screw.

Those only who have travelled in the States, and noticed the frequent absence of live fences (the Osago orange being the only fence-plant I met with, and this is but a poor substitute for our whitethorn), and have also remarked the extreme roughness of the ordinary fencing, will properly appreciate the importance of Mr. Hall's invention, which is, as far as fencing is concerned, a complete joiner. It combines a circular saw, a reducing and tenoning arrangement, by which the rails are prepared for insertion in the posts, and a series of augers by which the holes are bored and countersunk. After one set of holes are bored, the position of the post is altered, and a second set of holes, occupying intermediate spaces on the opposite side, are made. This completes the operations, and all that remains is to set the posts and drive home the rails. Two different kinds of fences can be made by this machine, both set in zigzag form. No. 1 is described as the rough-and-ready fence, and its advantages over other fences are thus described. Increased strength, derived from its large and uniform bearings and stiff connections in the post (the rails fit exactly into the holes); increased durability from a more perfect seasoning of timber, from boring, and a sheltered or countersunk bearing; increased value from its interchangeable features; that it is more portable (and more *durably* portable) than any other fence equally strong, and may be made desirably light; that it utilises poles and small timber, and also economises sawed lumber or split rails; that in the construction it does not cut away the post or the rails as much as old methods, and that it leaves the fence stronger at that part instead of weaker; and lastly, that any wind or force whatever, tending to disturb it in any direction, is by the "mechanical resolution of forces" transmitted to the tenons on the rails, and is by them resisted by their combined action and the full strength of the rail or pole, which is not the case in any ordinary fence.

No. 2 is a combination-wire and rough-and-ready fence, and only differs from the first described in having the middle rails replaced by strained wire. Such a fence would be valuable when timber was scarce. The Fencing Machine weighs 1100 lbs., is driven by four horses, and costs 300 dollars, *i.e.*, 55*l.* Mr. Hall states that two men and a boy can prepare from 50 to 80 rods a day, and that the saving of material pays for dressing. Such a machine would be invaluable for a contractor undertaking inclosure-work.

A. Le Betts, of Troy, New York, exhibited a Wood and Wire Fencing Machine, of which I was unable to obtain an illustration. This ingenious piece of mechanism is for the preparation of light portable sheep-fencing. The wire is fed into the machine from spools; a lad places the wooden uprights across and under the wires. The staples, which are hung upon inclined rods, come to their place over the wire, and are driven into the wood by hammers, regulated by cam-gearing. The distance between the wooden uprights can be either 6 or 12 inches, according to the use for which the fence is intended. The uprights are 1¼ by 1 inch, and 4 feet long. As fast as it is made, the fence is wound round a barrel for transportation. I was informed by the inventor, that two men and a boy could make 200 rods of fencing in a day.

Ditching and Excavating Machines were shown of various forms. That which, as far as could be judged from observation, appeared the most serviceable, was the invention of Thedore F. Randolph of Morristown, New Jersey, sold by Randolph Brothers, New York. It comprises a beam supported on four wheels; in the centre is the cutter wheel, so arranged as to take out a given depth at each revolution, bring the soil up with it, and distribute it on either side of the cutting. This is effected by means of an apron with two faces, which receives the soil from the channel on the circumference of the wheel, and throws it off on both sides, clear of the ditch or drain. The cutting-wheel is adjustable according to the depth of the cutting; and the whole apparatus is drawn along by horses, either attached direct or working through a capstan. The implement is made of different sizes; that exhibited in the Agricultural Hall was for 3 horses, calculated to dig drains 30 inches deep, and do the work of 20 men.

Peter J. Strykers, of New Brunswick, exhibited Slusser's Self-loading Excavator. This is a very efficient machine. The excavator, which consists of a strong scoop, is situated between the front wheels, and can be raised or lowered as required, by a lever-handle from the driver's seat, which is fixed above the excavator. Behind the excavator is an elevator, connecting with the cart body, which is driven by chain-gearing from the hind wheels; the bottom of the cart or receptacle is hinged in three divisions. When it is desirable to discharge the load, the driver operates on leverage within reach of his seat, whereby the divisions are let down, and three large openings made, through which the soil finds a vent.

Messrs. Rhodes and Waters, Elyria, Ohio, have patented a *Post Hole-digger*, which has some advantage over the ordinary auger borers, and will answer well in ordinary soils, sands and gravels. The jury submitted this implement to rather a severe test, viz., digging a hole on a gravel road outside the Hall; which was done in a very satisfactory manner. The digger consists of two gouge-shaped blades, attached to two jointed handles. When the soil is being disturbed, these handles are brought close together. The digger is thrown into the soil as a chisel-bar or drill, and when the soil is loosened the handles are spread out, which brings the blades together, enabling them to hold a considerable quantity of soil, which is then elevated and removed. The wholesale price of this implement is about 3¼ dollars.

In a country where land is so often being cleared, *Stump Extractors* are necessarily of great utility. Several different forms were shown; that which I select for description is Davis's Rock and Stump Extractor, shown by *A. C. Cotton*, Vineland, New Jersey. Inasmuch as the construction of lever and ratchet-wheel renders slipping impossible, every inch raised is secured. The apparatus consists of a ratchet-wheel and sproggle-wheel, on the same axle, suspended by a strong iron link, to which the short arm of a long lever is hung; a pin across this link forms the fulcrum of the lever; the top of the link is held by a chain to the junction of three teagle poles; a loop at the end of the lever catches in the teeth of the ratchet and allows of the latter being moved by the lever; consequently the chain held by the sproggle-wheel, to which the tree, root, or stone is attached, is also moved, so by degrees the obstacle is drawn. It is quite evident that the power of such a leverage is very great, and only limited by the strength of the apparatus; and it is said that one man can easily raise a weight of ten tons. The practice is to allow the roots to remain for a sufficient time in the ground after the trees have been cut, to rot the smaller rootlets. Then the apparatus is fixed above the root, and the hooks of the chain inserted on opposite sides of the stump, and the raising process can proceed. One man works the lever, whilst the other is ready to assist the process by cutting through stubborn rootlets. The retail price of the large-sized machines, capable of raising weight or overcoming a resistance of ten tons, is 40 dollars, but the iron work, which is all that is required, could doubtless be obtained at a much reduced rate.

Amongst Miscellaneous exhibits, I must draw attention to the *Automatic Incubator*, shown by *S. A. Day and Company*, of Baltimore, which is highly ingenious, and apparently efficacious. It consists of a large square box, heated from under the centre by a coal-oil lamp; above the lamp is a heater which acts upon water in a vat, and the hot air circulates through the box, which has shelves arranged for the eggs. The object is always to secure an even temperature, consequently the lamp requires manipulation; it must be either turned up or down, according as the temperature advances or recedes from 103°. This is effected by the unequal expansion of a bar composed of india-rubber and tin. As the temperature rises, the bar moves by the expansion of the rubber, and acts on compound levers, which act upon the wick-regulator. By another equally clever adjustment, the contraction of the bar is made to act on a watch-spring, which rings a bell in the event of the lamp going out, and thus attention is called to the requirements of the incubator.

Professor A. Corbett, of Hicksville, Long Island, is the inventor of a very simple *Incubator and Artificial Mother* combined. The apparatus consists of a cask or cylinder of wood, near the bottom of which is a door for convenient access; when let down, this door, which is hinged to the bottom of the cylinder, forms a passage for the chickens. The idea is to utilize the natural heat of horse-manure, which is packed round the box, and renewed if necessary, according as the thermometer indicates. The Artificial Mother consists of a cylinder fitting the cask, which is lined on the under side with wool; its position on the cask being regulated by a screw. The Artificial Mother can be applied to the Incubating Cask, but when the business is conducted on a large scale, it is better to have separate casks. The eggs are placed in a circular tray on the bottom, where they can be readily attended to.

The *Honey-Extracting Machine*, exhibited by *Murphy and Company*, of Fulton, Illinois, is well adapted for its purpose, viz., extracting the honey without destroying the comb; it comprises a copper cylinder, tinned on the inside, containing a rectangular revolving frame, the sides of which are covered with fine wire-gauze. The comb, taken from the hive before the last process of sealing up the cells occurs, is placed in the frame, which is revolved through the agency of a handle by bevel gear-wheels. The centrifugal force causes the honey to discharge into the cylinder without injury to the comb, which is replaced in the hive and refilled, and thus, by this ingenious device the maximum produce is secured.

H. Burden and Sons, of Troy, New York, showed a model of their *Machine for Making Horse-Shoes*. The material used is a mixture of hematite and magnetic ore. The bars, when rolled out to proper dimensions, are fed into the machine by fluted rollers; first, the iron is cut off at the proper length, then the shoe is formed, next it is stamped by passing between an upper and lower die. The holes are not punched, but a creasing die marks the place where the holes are to be made; lastly, the shoe is straightened by a press, and thrown off at the rate of 60 shoes a minute. The machine has only four gear-wheels, is simple in construction and very strong. I understand that the works, which include the manufacture of iron for other purposes, are very large, and that the horse-shoe factory has a capacity for making 60,000,000 lbs. weight of shoes annually.

J. E. Strong, of Newton Brook, Ontario, Canada, exhibited a *Self-acting Snow Gate*, which, for simplicity of construction and efficiency of operation, was greatly admired. The heel of the gate is suspended between two posts, the tops of which form the fulcrums for the lever, by which the gate is moved backwards clear out of its place. A strong double stay, hinged at both ends, connects the top bar with a block let into the ground immediately behind the posts. This connection secures the position of the gate in a straight line. All that is necessary is for the traveller to pull down the lever, when the gate, which is connected with the short end of the lever by an iron rod, describes the parabola of a curve, and is landed clear of the posts exactly in rear of its ordinary position; on passing through the gate, the traveller seizes the opposite lever and as readily replaces the gate in its original position, at the same time securing it by a spring-lock. The gate may be made light and strong. The value of such an invention in a country where snow is often a serious impediment to the opening of ordinary gates can be readily understood.

The climate of California and adjoining States is very favourable to the growth of fruits of all kinds, and the drying and preservation of them is an important branch of industry, which was represented at Philadelphia by a variety of machines.

One of the most complete arrangements was shown by *O. F. Tiffany*, of San Francisco. The apparatus, which is of large dimensions, has a hot-air chamber in the basement with two dampers for the admission of cold air, one into the chamber and one above, the draught-stack for the furnace forming a natural draught. The under side of the roof is so contrived as to form a vapour conductor. The moisture that forms is collected in spouts, which find their way into a conductor with a syphon-spout filled with water, and thus the escape of heat is prevented. The sieves holding the fruit are placed on frames, which run on wheels, and are thus readily removed when the process is completed, or they can be shifted from storey to storey by an elevator.

Another large apparatus was shown by *Jones Brothers*, Sturges, Michigan; the special feature of which is a double-action fan, worked by horse-power, the degree of heat being regulated by a shutter. The screens are in ten sections, and the fruit is passed forwards according to its condition. It is said that, owing to the action of the fan, the fruit can be dried more rapidly and at less cost than in any other machine.

George A. Deitz, of Chico, California, exhibited the largest machine of any, having 420 feet of drying surface. The arrangements for regulating the temperature and procuring a thorough circulation of hot air are very perfect. Temperature can be varied from 70° to 200°, and fruit can be dried in 1½ hour. The trays are run upon rollers and easily removed.

The Cider manufacture is also a considerable interest in some of the States, consequently machinery for both power and manual labour was shown by several makers.

The lead was taken in large machinery by *Messrs. Boomer and Boschert*, Press Co., Syracuse. The Apple-mill comprises a cylinder furnished with a number of knives; the section of these knives is adjustable by two screws. The fruit is kept up to the cylinder by means of a spring-jaw, which is adjustable; and, after passing through the mill, it falls into an open box divided into two compartments by a movable door, so that the pulp can be delivered from either end of the machine to the press. The press is of a very powerful description, consisting of a cross screw with double leverage threads. The downward motion is slow, so as to secure the full action of the press. The screw is automatic, stops itself, and rises five times as rapidly as it falls. Smaller presses for hand-power are shown by this firm, but I preferred the mills made by the Keystone Manufactory Company, P. P. Mast and Co., and Messrs. Ludlow and Rodgers. In the former, the hopper is provided with an adjustable jaw, and small roller to regulate the feed. The mill consists of two horizontal rollers, with conical sections fitting into each other, and covered with numerous small projections on the surface, which greatly increase the pressing surface. Another important feature of efficiency is the fact that one roller revolves three times as rapidly as the other. All the bearings are adjustable to compensate for wear. The press is powerful and efficient. The other machines are of very similar construction, differing only in details.

One of the most ingenious inventions in the Agricultural Hall was *C. H. Dana's* (West Lebanon, New Hampshire) Sheep-Label Machine, which can be worked by a boy, and turns out 1000 labels, numbered and initialed in 15 minutes. The material (label wire), tougher than steel, is fed in. The proper quantity for the label is cut, then numbered, the figures being on a revolving press; next the initials are stamped, and lastly, the label is bent in the proper form for insertion in the animal's ear. Different sized labels are made, suitable for cattle and sheep. Mr. Dana is the author of an excellent Breeding Ewes Register, which is sold for 50 cents. The price of the labels, with numbers and name, is 3 dollars a hundred. The only disadvantage in this method of marking, is the fear that the ring might become caught in some obstacle, in which case there would be risk of the ear being injured.

P. P. Flournoy, of Bethesda, Maryland, is the inventor of a Pruning Implement, which may be shortly described. The cutting apparatus consists of the combination of a chisel-knife A, and a hook-knife B (Figs. 67 & 68); the latter has a slot, *a*, in its shaft, in which a rivet attached to the chisel-knife slides when the knives are opened or closed; when the knives are drawn together in the operation of cutting, by pressure in the direction of the shaft D, the screw, or bolt, which attaches the hook-knife B to the handle C, slides along the curved slot *b*, towards the axis upon which the chisel-knife A revolves, so that the lever power by which the blades are forced together is continually increased as the operation proceeds. The chisel-knife A is attached to the handle C by a rivet, which is stationary at *l*, the end of the shaft works against a spring on the back of the handle (see *g*, Fig. 68) so that when the operation is complete, the knife is thrown back to its position, and the spring then presses on the surface *l*, so as to hold the knives open. The handle C is attached to a wooden shaft, D, by a bolt and tap, and an extension shaft, E, can be added if required. To this a saw, F, can be attached if desired. This implement was tried on some trees in the Exhibition grounds, and did good work, cutting branches 2 inches in diameter.

Fig. 67.—*Flournoy's Pruner.*

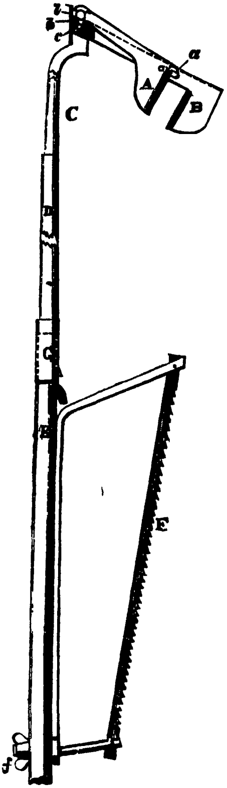


Fig. 68.—*Flournoy's Tree-pruner.*

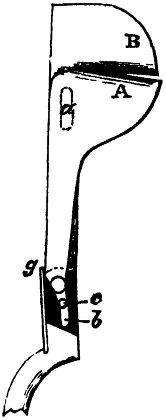
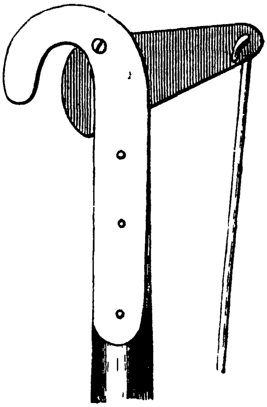


Fig. 69.—*Waters' Improved Tree-pruner.*



A cheaper and more simple implement was shown by *E. S. Lee and Co.*, Rochester, New Jersey, viz., *Waters' Improved Tree Pruner* (Fig. 69). The cutting blade is pivoted on the neck of the fixed blade, and worked by a lever handle from the bottom of the shaft. The fixed blade, which is hooked, is placed over the bough, and by working the lever handle, a series of chops are made on the under side of the branch.

The machinery for facilitating domestic processes was numerous, varied, and ingenious; but I am conscious that already my notes have extended beyond reasonable limits; suffice it,

therefore, to remark, that important interests are involved in the manufacture of articles such as ice-freezers, sausage-choppers, cabbage-cutters, &c., fruit and potato peelers, that most ingenious devices abound, and that, in every department, the important question of labour saving has been fully kept in view.

It will probably have struck my readers with the same surprise that I experienced, to find that the manufacture of comparatively insignificant articles, such as a milk-strainer, a pan, or a butter-tub, a meat-chopper, a vegetable-cutter, a potato-peeler, &c., have given rise to a trade expressly arranged to produce such articles, if not solely, at least as their main industry. This fact, and the enormous capabilities of many of these interests, enable one to realise the vastness of the country that has such requirements. There may be general makers, as we have, but judging from the exhibits at Philadelphia, I should say that the principal manufacturers have each their speciality, and endeavour to acquire perfection in that particular. The consequence is that the consuming public are excellently supplied; and not only is the trade kept in a healthy condition by competition, but the farmers have an organisation amongst themselves known as "The Grange," which, probably originally intended for political purposes, has found its chief utility in disseminating knowledge of a practical nature to its members, and in checking the profits of agents, as well as in endeavouring to counteract the tendency to excessive freights, which Railway Companies who enjoy a monopoly are too apt to try and enforce; acting, in fact, on a large scale, the same part as the Agricultural Co-operative Association does to its members here. It is quite possible that, at an eventful crisis, the machinery of "The Grange" may be effectively worked for political purposes. At present, the agricultural classes are too much isolated, and their own opinions are too much divided to allow of such united action. I have no doubt that, when the time comes, which I believe is not distant, for an alteration of fiscal policy, the farmers will speak out through these Granges for free-trade. To return for a moment to the consideration of the agricultural machine trade. It is wonderful what prodigious strides have been made of late years, and especially during the years of feverish prosperity which followed the war. Confining attention to the manufacture of mowing and reaping machinery alone, the annual production is almost incredible. I visited the splendid manufactory of McCormick and Co., situate on the outskirts of Chicago. Though of vast dimensions, machinery is made to economise human labour to such an extent that the staff is only 500 hands, and most of these are conveyed to and from the city by a special train belonging to the firm. Last year, 1875, they turned out 12,000 separate machines, and confidently anticipate to do as much this year. The three firms which manufacture the Champion Machine Patents, have capabilities to produce 30,000 machines per annum. Johnstone, F. D. Osborne, W. A. Wood, W. Anson Wood, are all large makers; and the question may well be asked, Where can a market be found for such an outcome? Hitherto the rapidly extending area brought into cultivation has sufficed; but the home demand must at the present time be more than provided for, and many of the leading firms are actively campaigning for foreign custom. It is believed, and not unreasonably, that a considerable impetus will be given to export trade as one result of the Centennial Exhibition. If we seek for causes to explain the extraordinary inventive activity which has of late years especially distinguished our transatlantic brethren, we shall not have far to search. Machinery in a sparsely populated country, with such vast resources waiting only labour to develop them, is a necessity to existence. The demand has created the supply, until at the present time the latter has somewhat outrun the former. Invention has been fostered and encouraged by the laws of patent right, which I believe are more favourable than with us; the smallest detail can be protected. Not the least of the many interesting sights which I saw was the marvellous collection of Models of Patents in the Patent Office at Washington, a museum that well repays careful inspection. Here were found illustrations of every design that had been patented, arranged in order of age, so that a comparison of progress was possible; and the fullest information could be obtained by those who were interested. In bringing this article to its conclusion, I must crave the indulgence of my readers, both for its great length and its many deficiencies. It is not intended to represent, by any means, a complete account of the Agricultural Machinery of the Philadelphia Exhibition as a whole; a volume would be required for such an object, but rather to convey some idea of the character of the Exhibition, and more especially to afford information as to some, at least, of the more prominent labour-saving machines of which at the present time we stand in almost as much need as our American cousins.

II.—*Fruit-growing in Kent.* By CHARLES WHITEHEAD, F.L.S., F.G.S., of Barming House, Maidstone.

KENT has been celebrated for the production of famous fruit for several centuries. Drayton, in the first decade of the seventeenth century, thus apostrophised the county, in his quaint 'Polyolbion':—

> "O, famous Kent!
> What country hath this isle that can compare with thee,
> Which hast within thyself as much as thou can'st wish?
> Thy conyes, ven'son, fruit, thy sorts of fowls and fish:
>
> . . . .
>
> Whose golden gardens seem th' Hesperides to mock:
> Nor there the damson wants, nor dainty apricock,
> Nor pippin, which we hold of kernel fruits the king,
> The apple orange; then the savoury russetting,
> The sweeting for whose sake the plowboys oft make war."
>
> . . . .
>
> And sundry other fruits, of good yet several taste,
> That have their sundry names in sundry countries placed."

Fruit-lands—orchards—are frequently mentioned in charters or deeds granting or conveying lands in the reign of Charles the First and James the First, in various Kentish parishes where fruit is now grown. Lambarde, in his 'Perambulation of Kent,' says that King Henry the Eighth's fruiterer planted at Tenham in 1583, "by his great coste and industrie, the sweet Cherry, the temperate Pipyn, and the golden Renate," having obtained the "plantes from beyond the seas."* Since the time of Lambarde's work the area of the fruit-plantations in the county has varied considerably, to a certain extent according to the profit made from the cultivation of hops, which were brought from Flanders in the sixteenth century. When hops paid well, fruit-trees were grubbed up and hops were planted in their stead. When hops did not pay, fruit-trees were substituted for these more speculative plants; and this alternating process has been continued up to recent times. Hasted, in his 'History of Kent,' published one hundred years ago, remarks of certain parishes in East Kent, that "there were large plantations of fruit till they were displanted to make room for hops, which are found to thrive well in old orchard ground." He adds, "Orchards are beginning to be planted again in consequence of the low price of hops."†

The climate of Kent is temperate, and in most seasons the common fruits ripen well; the mean temperature of the three summer months is about 61°, and that of the three winter months about 38°. The average annual rainfall is about 26 inches. There is strong evidence that the climate was more genial in earlier times, as grapes were largely grown, and ripened out of doors, and wine was regularly made from them. Mention is made of vineyards—vineæ—in the records of the survey of Domesday, taken in the early part of the eleventh century. In the reign of Edward the Second, when that king was at Bockinfold in Kent, presents of wine and grapes were sent him from the vineyards near Rochester. Hasted states that he "knew two exceedingly fine vineyards in the county, one at Tunbridge Castle, the other at Barming, from which quantities of well-flavoured wine had been produced." In the parish of Hunton, at Buston, the former seat of the Fane family, there are remains of an old vineyard, and three distinct terraces rising above each other may be traced. These are faced with brick walls, and are protected from the north by a hill. This is called the "old vineyard" to this time, and fine fruits of many kinds are grown in great abundance on the rich soil of its sheltered slopes. It very seldom happens that grapes ripen thoroughly in these days, even in the hottest summers in the most sheltered spots of the county, or that grapes are grown out of doors at all fit for making wine.

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* 'A Perambulation of Kent' By William Lambarde (1591).

† Hasted's 'History of Kent,' vol. i. p. 539.

Grapes cannot be produced fit for wine-making purposes unless the summer temperature exceed sixty-four degrees. Humboldt, the authority for this statement, wrote:—"Taking an example, for instance, from the cultivation of the vine, we find that in order to procure *potable* wine, it is requisite that the mean annual heat should exceed 49°, that the winter temperature should be upwards of 33°, and the mean summer temperature upwards of 64°." * From the fact that grapes do not ripen now in Kent as they did four or five centuries ago, it must be inferred that the climate has undergone a change, that the mean summer temperature has gradually been lowered. This may be the reason why the old sorts of apple, the Ribston and Golden Pippin, and other more delicate sorts, do not thrive as well as those of later origin, and more to the manner born. It is suggested that this slight and gradual change in the climate of Kent is due in some degree to the clearing of the forests, with which parts of Kent were formerly covered; such as the great Forest of Anderida, which extended from Lympne through the Weald of Kent into Hampshire, and Saenling Forest in the extreme east of the county; with other forests, described by Mr. Furley in his 'History of the Weald,' that have been grubbed since the Saxon period. Mr. Furley mentions that the Isle of Thanet, now an open tract of fine arable land running out to the North Foreland, was formerly covered with timber.* The removal of these great forests and woods, which has gone on steadily since the date of Magna Charta, has let the cold winds and sea breezes from the north-east and the south-east, sweep directly over the unsheltered land, chilling the air and lowering the temperature.

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* Humboldt's 'Cosmos,' vol. i. p. 331.

Although Humboldt† held that extensive forests are among the causes tending to lower the temperature of a district, it by no means follows that their clearance would ensure an increase of temperature. Dr. J. C. Brown, in his recent work entitled 'Forests and Moisture,' has shown that disforestation makes a country more dry, and that planting gives a country humidity; but he has not shown that a climate has been altered in respect of heat or cold, in its mean summer temperature, either by disforestation or by the planting of trees.

Fruit-plantations and orchards in Kent have been planted and replanted, grubbed and regrubbed, most promiscuously during the 300 years preceding this generation, to make way for hops when that very uncertain crop was profitable, as well as after successive large growths of fruit, which from the then comparatively limited demand, and the heavy cost of conveyance, barely paid expenses. Foreign competition, it is true, was insignificant, with regard to soft fruits, as cherries, gooseberries, currants, until within the last 40 years; yet there was no trade with the thickly populated towns in the north of England and in Scotland, until railways had made the carriage of goods cheap and expeditious. Since the development of the railway system, there have not been such capricious alternations in the fruit-growing acreage, which has been steadily increasing.

In the parts of the county suitable for fruit-growing, almost all the farms have a certain proportion of fruit-land, as a hedge against the contingencies of hop-growing. The profits of fruit-growing are not so large as those of hop-culture in good seasons; on the other hand, the chances of possible losses are not nearly so great. Men may make or lose fortunes by hop-cultivation; but fruit-land of fair quality will show a steady remunerative return upon an average of many years. During the last 10 years, much land has been planted with fruit in the north-western part of this county, between Orpington and Crayford. Large woods of poor quality, which grew birch, beech, and other trees of low value, have been grubbed there, and planted with plum, damson, and apple-trees, gooseberry and currant bushes, raspberry canes, and strawberry plants, which pay well, especially the last named, as the distance from London is short, and the fruit can therefore be sent in fresh and early to the markets.

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* Furley's 'History of the Weald of Kent.'

† *Op. cit.*, p. 326.

In the Weald of Kent also, where apples alone were grown until quite recently, black currants, gooseberries, and plums have been, and are now being, planted to some extent. Fruit of various kinds is also cultivated throughout the country by persons who have a few acres planted with fruit-trees, and who are, as a rule, a most industrious and prosperous class; as well as by cottagers in their gardens. In good seasons a few apple or plum trees, or some rows of gooseberry or currant bushes, help materially to pay their rent. A garden of this kind, well stocked with fruit-trees, has often been the means of giving an industrious labourer a rise in position.

Fruit is grown mainly in three particular districts of the county, situated in East, Mid, and West Kent, whose respective areas are determined in a degree by geological conditions. In the first-named district fruit is cultivated in the parishes lying between Boughton-under-Blean, to the west of the city of Canterbury, and Rainham, a few miles east of the city of Rochester. Lambarde has it that there were thirty fruit-growing parishes here, but there are hardly so many in these days. Cherries are grown here in large quantities; in fact, this is the cherry-garden of England *par excellence*, though other fruits are grown and the acreage of mixed plantations is constantly being increased. The soils upon which the greater part of the fruit is grown in this part of East Kent are clays and loamy clays of the Thanet beds; the "plastic clays" of the Woolwich and Reading beds, and of the Oldhaven beds, as at Selling.* These all crop up variously in this locality, and overhang the chalk, whose hills form the range known as the "back-bone of Kent," stretching through the whole upper part of East Kent, through North and West Kent. There is an almost continuous stratum of the Thanet beds above the chalk from Rainham to Sittingbourne upon which the fruit is principally grown. Between Sittingbourne and Boughton Blean, the limit of the fruit-growing line, the Woolwich beds—the middle division of the Lower London Tertiaries—appear in alternation with the lower series of Thanet beds.† To these formations the upper parts of East Kent owe their fertility. Upon these most of the orchards, plantations, and hop-grounds are situated. A small proportion only is placed directly on the mere surface-marls of the chalk.

In Mid Kent the fruit plantations are upon the Hythe beds of the Lower Greensand. The best and most productive soil is the clay loam on the beds of "Kentish Rag," in the neighbourhood of Maidstone, upon which all fruit-trees do well. Mr. Topley comments as follows upon this: "The most fertile district of the Hythe beds is that near Maidstone. Enormous quantities of hops are grown here, and also filberts and fruit."* Fruit is grown also upon the lighter and "stone shattery" soil of the Hythe beds, but the great bulk of it is produced upon the ragstone soil which is undoubtedly, as Mr. Topley suggests, more fertile in the neighbourhood of Maidstone than elsewhere. The Thanet, and the Woolwich and Reading beds are found in the third fruit-growing division of the county; by their superposition over the chalk, making the district eminently suitable for the production of fruit. It is curious to note how sharply the fruit-growing line is defined here, and how perfectly concurrent it is with the outcrop of these beds,† running from Halstead, near Sevenoaks, to Chelsfield, then, after a break, to Orpington and on through the Crays.

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* 'Memoirs of Geological Survey,' vol. iv. p. 76.

† Ibid., p. 98.

Until quite recently, apples were the only fruit grown in the Weald, though in the last ten years other fruits have been cultivated. In the term "Weald," as locally used, the whole of the district in Kent "under the hill," or southward of the Lower Greensand formation, is included. Geologically, it comprises the Weald Clay and the various sands and clays of the Hastings Sand. Fruit does well on the former, as at Marden, Staplehurst, and Cranbrook, and upon the Grinstead Clay of the latter formation, as, for instance, at Brenchley and Horsmonden.

An improvement has taken place in the management of fruit-land in Kent during the past twenty-five years; and at the same time greater facilities of transit and a steadily increasing demand have led growers to add largely to their plantations. This is proved by the Agricultural Returns for 1875, which show an increase of 846 acres in 1875 over the return of 1874; the acreage of arable or grass lands used for fruit in Kent being 12,032 acres against 11,186 in 1874.

Foreign competition‡ has assumed enormous proportions, and is becoming more formidable each year. This has stimulated Kentish producers to pay greater attention to the cultivation and management of fruit-land as well as to the selection of better and more attractive sorts. In those parts of the county where the soil and climate are suitable, the production of fruit is very great and the quality is for the most part good. The area, however, of land that is specially adapted to the successful growth of fruit is limited and confined, as has been shown, to a few districts sharply defined by peculiar geological features. Situation, or the "lay of the land" as it is called by the natives, has also its influence in deciding whether land is fruit-land proper, just as in hop-growing certain aspects and position are essential, *cæteris paribus*, to constitute really first-rate, "lucky" hop-land.

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* 'Memoirs of Geological Survey.' "Geology of the Weald." By W. Topley, F.G.S., p 253.

† See Map No. vi. illustrating Geological Survey of Great Britain.

‡ The imports of raw fruit in 1875 from the chief importing countries were:—Belgium, 703,777 bushels; France, 581,170; Holland, 199,860; Spain, 199,650; the United States, 164,160, Germany, 146,493.

Though a certain amount of improvement has taken place in the methods of fruit-culture, there is much still to be done as regards the methods of planting, the actual cultivation, and the pruning of the trees. The delicate and important operation of pruning, which makes all the difference between high and low production, is, it must be confessed, but imperfectly understood by Kentish fruit-growers, and their tree-cutters or pruners. Instead of the careful selection of the wood most likely to bear fruit,—in place of a *raison d'être* applied to every stroke of the knife,—the typical tree-cutter hacks and slashes away ruthlessly, aiming principally at obtaining a symmetrical cup-shaped form rather than at retaining the wood most likely to bear fruit. He is paid by the tree, and cannot afford pauses for reflection as to individual shoots or buds, like the careful interested pruners in France and Belgium, or like some of the best English gardeners. He and his employers have certain rough-and-ready formulas which guide the knife, as for example, "Black currants bear on this year's wood, therefore all old wood should be cut away;" and the general idea pervading the mind of the pruner is that he cannot cut black currant bushes too hard. In the case of other bushes—red currants for instance—the fruit is for the most part developed on the old wood, therefore all young shoots are religiously excised. There is this to be said, that where a grower has forty or fifty acres of fruit, it would be practically impossible to give each tree, each shoot, each bud the individual attention that is given to the cordon-trained trees of Mid-Central France. With regard to apple-trees, their pruning is performed in the most desultory manner. In many cases they have not been pruned for generations and are overgrown with unproductive branches. Now and then it happens in some orchards —to use the graphic words of a correspondent—"that an ordinary workman is sent in with a saw to cut the apple-trees, and is expected to earn more than his money in faggots." It was formerly the prevalent notion, still holding to some extent, that fruit trees require but little manure. Apple and cherry orchard-lands were mown or fed off with lean sheep year after year, with the result that the trees only bore a crop once in two years, and the fruit grew small by degrees and beautifully less. The owners of the celebrated cherry orchards in East Kent have found out the folly of starving the trees. For the last few years they have manured the land liberally with manure brought from the London stables and cow-sheds, which has largely increased the quantity and improved the quality of the fruit. Sheep fed with corn and cake feed off the grass, and it is now quite the exception to mow orchard-land.

The cultivation of fruit affords constant work of a comparatively pleasant and easy nature to very many hands throughout the summer. Picking all fruit but apples is usually done by women, who are paid by the day, or by the sieve or bushel, and who earn from 1*s*. 6*d*. to 2*s*. 3*d*. Packing is performed by careful men, who arrange the fruit in the sieves so that it may appear to the best advantage, covering it with paper, dried grasses, or fern leaves, and fastening it down with transverse sticks laid across.

The East Kent growers send their fruit by rail and steamboat to London. Nearly all the fruit grown in Mid Kent is forwarded by rail. In a good year the railway stations in the chief fruit-producing localities are thronged with vans laden with fruit, from the early green-gooseberry season, in May, until the apples have all been gathered, at the end of October. Many of the West Kent growers, being near London, send up their fruit by road. As a rule, the best fruit is sent to Covent Garden, —"The Garden," as it is styled—to the Borough, and Spitalfields Markets. Very choice fruit, however, generally finds its way to Covent Garden. A large proportion of the fruit is consigned to salesmen who first satisfy the requirements of fruiterers, greengrocers, and "costers," for retail purposes. Afterwards the agents of large jam and preserve manufacturers at Liverpool, Manchester, Birmingham, Glasgow, and other towns, buy enormous quantities; the inferior and damaged qualities go to smaller houses for smashing up into a heterogeneous mass, named in accordance with the demand. In some cases strawberries, raspberries, and currants, are sold by the growers to contractors by the ton. To give an idea of the extent of jam-making, the 'Liverpool Courier' stated lately that at a manufactory at Bootle about 15 tons of preserves are made in one day in a good fruit season.* The large towns in Scotland chiefly take damsons, black currants, and Warrington gooseberries.

It might be supposed that Kentish fruit-growers, only forty miles distant from London, would not be affected in any great degree by the competition of foreigners in the matter of soft fruit, *i. e.*, fruit of a perishable nature, as gooseberries, raspberries, currants, and strawberries; yet, as a fact, the cost of carriage of a ton of fruit from France to the London Docks is no more than from Maidstone to the London markets. Rents and labour are cheaper in France and Belgium, while the climate of the former country is far more suited for the production of fine well-flavoured fruits than our own.* Mr. Bréhaut remarked upon the point that "in making any comparison between the state of fruit cultivation on the Continent, as compared with that in England, it must always be borne in mind that much of the land devoted to the purpose is, as regards climate and soil, the best in the world."† Continential growers are able to send fruit to London earlier than the home producers. They send strawberries, cherries, and other fruits in quantities, and "take the edge off the appetite of the people," to use the forcible remark of a worthy salesman, "before Kent cherries are fit to eat." There is, however, the solatium that if Kent growers do not get the first "pull," they have the field pretty well to themselves for a time, after the foreign soft fruit season is over, before the gages, plums, apples, and pears are ripe. Still, in spite of all the advantages possessed by the "foreigners," their fruit is not so good, taking it generally, as that grown in Kent, which is acknowledged to be, on the whole, better than any other that comes to London. Fruiterers and salesmen say that the foreign fruit has much improved in flavour and size, and is steadily improving, while the imports are increasing year by year, as may be seen by the returns of the Board of Trade, which show that the total amount of "raw" fruit imported into England in 1875 had reached the enormous amount of 2,220,412 bushels, as against 1,128,568 bushels in 1871. France sends strawberries, cherries, red currants, gages, plums, pears, and apples; and sent to this country 581,170 bushels of "raw" fruit in 1875, against 354,606 bushels in 1871. Plums and currants arrive from Belgium and Holland. Apples and pears are imported from Spain. Immense quantities of apples come from America,‡ of fine quality and flavour, almost equal to Ribston or Cox's Pippins in good seasons. These arrive generally in excellent condition, being packed in barrels like oil-cake; and they interfere much with the price of Kentish apples. For example, last year, Newtown Pippins of splendid appearance and excellent quality were selling at rates which materially depreciated the value of the best Kent apples, of which the crop was very small.

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* A fruit salesman writes: "Speaking within limits, I should think from 300 to 400 tons are smashed up daily in the soft-fruit season."

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* 703,777 bushels of raw fruit were sent to England in 1875 from Belgium, the value of which was 160,548*l.* France sent 581,170 bushels, whose value was 271,278*l.* showing that the quality of French fruit is far superior.

† 'Report on the Present State of Fruit Cultivation on the Continent (1868).' By the Rev. T. Collings Bréhaut.

‡ A large Covent Garden fruit merchant wrote on the 18th of December, ult.: "This day alone there are 16,394 barrels and 109 cases of apples from America, to be sold by auction."

There can be no doubt that so long as sugar continues to be cheap the demand for fruit will be, as now, enormous, and will probably absorb even a largely increased supply. At the same time, such large additions are being steadily made to the home and foreign plantations,* that Kent growers, though they plant on, do it with a degree of anxiety which makes them, and ought to make them, most careful in their selection of proper kinds of fruit for their new plantations, as well as in the renovation and cultivation of those that have been long established.

Having glanced at the history and conditions of fruit-growing in Kent, it will be well to describe the methods of cultivation usually adopted.

Two principal systems or methods of planting fruit prevail in Kent. One according to which it is intended that the land under the standard trees shall be eventually laid down with grass. The other, where the land will always be cultivated and kept constantly filled up with fruit-trees, and bushes under the standards or half-standards. East Kent growers for the most part adopt the former method, because it is not good for cherry-trees that their roots should be disturbed after a certain time. The standard trees are planted first on well prepared arable land, with hops or fruit bushes, which give a return until the standards come in. When these have arrived at a good size the hops and bushes are taken away and grass seeds are sown. Apple-orchards are occasionally formed in this way; but apples are generally grown on the other system—in permanent plantations set out and planted with plums, damsons, gooseberries, and currants, (and filberts in some parts of the Mid Kent district,) which are renewed from time to time as occasion requires. In an orchard which is eventually to be laid down with grass, the standard trees, if cherry-trees, are set from 33 feet to 24 feet apart each way, giving from 40 to 75 trees to the acre. If apples are planted they are set about the same distance apart. Plums or damsons are very often put between the apples or cherries, and are taken out when they get in their way. In a plantation that is to be permanently cultivated the apple-trees are set about 30 feet apart. Plums or damsons would be set in between each apple-tree, and gooseberries or currants between the rows, 6½ feet apart, so that there would be 44 apple-trees, 44 plum or damson trees, and 1031 bushes on each acre. Where filberts are grown under apples, they are usually planted about 13 feet apart, which would give about 257 trees to the acre, and plums or damsons are not generally planted in this case. The cost of preparing the land and of planting it as a mixed plantation, with all incidental expenses, varies from 16*l.* to 20*l.* per acre, according to the sorts and number of trees planted. Apple-trees cost 1*s.* 6*d.* each as an average. Plums and damsons 1*s.* each. Filbert and cob trees 4*d.* each. Gooseberry and currant bushes from 10*s.* to 14*s.* per 100. The annual average cost of cultivation, including rent, interest on outlay, tithes ordinary and extraordinary,* rates, maintenance, and other expenses, exclusive of all charges connected with picking and selling the crop, which would, of course, depend upon its amount, ranges from 13*l.* to 16*l.* per acre.

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* The 'Garden' for December 30th, states: "News reaches us from the Continent that fruit culture is being extended in many agricultural and pastoral districts."

It will now be convenient to describe the different fruits grown in Kent, commencing with

APPLES.

This fruit is grown chiefly in Mid Kent and the Weald of Kent. It is also grown in East and West Kent, though not to any great extent. In the first-named district the acreage of apple-orchards has recently decreased, especially of those under grass in the neighbourhood of Maidstone. The trees had become, in many cases, cankered from rough pruning, or overburdened with useless wood from the absence of judicious thinning. No pains had been taken to replace trees that had died. The grass had been systematically mown and kept unmanured, or had been fed off by lean stock. It is only recently that the occupiers of grass orchards have discovered that fruit-trees require a large and regular supply of manure, and that grass-land has more than enough to do, unassisted, to repair the waste caused by constant mowing, or feeding off with animals getting their whole subsistence from it. Many apple-orchards of this description, which old men can remember as having been abundantly productive of Nonpareils, Ribston Pippins, Margels, Golden Russets, and other apples of choice quality, rare size, and excellent flavour, have been grubbed up to make room for hops. As the best land was invariably selected for apple-orchards, in times when hops were not so highly esteemed, it is found that hops always thrive remarkably well in the "old orchard" grounds.

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* At the time of the commutation of tithes, in 1836, an extraordinary rent-charge was laid upon fruit-land of from 6*s.* to 8*s.* per acre, in addition to the ordinary charge. Hop-land is also subject to an extraordinary tithe rent-charge.

Most of the apples now produced on the Greensand are grown on land that is dug and hoed continuously, either upon full-sized standard or half-standard trees. The former, from too much or too little pruning, and neglect of long standing, are in an unsatisfactory state, not yielding a tithe of what might be expected. The half-standards, though not frequently met with, are comparatively young trees, having been trained in the way they should go in more enlightened times, and their fruit is of better size and quality. As has been shown, the land is thickly covered with trees of various kinds, so that in Midsummer it is often as difficult to force a way through some fruit plantations as through an ordinary copse, and it is a question whether the under trees, whose roots are nearer the surface, do not absorb the bulk of the manure and thus starve the apple-trees. In the Weald of Kent apples are grown principally on grass-land, the fruit grown in this way being of a somewhat better colour and quality than that which has been produced on cultivated land; and practical men hold that, independently of this, all apples grown on the Weald clay and Hastings sand are superior in colour and size and make better cider than the fruit grown in other parts of Kent, though there is not much difference as regards quantity. It is certain that apples grown on grass are not so liable to specks and blemishes. In the formation of an apple-orchard intended for grass, it is found in practice to be best to plant the trees on well trenched land, and to lay it down after a few years, when the trees are well established. I have planted apple-trees of the excellent variety known as "Lord Suffield" on grass-land and on cultivated land at the same time, both being manured in the same way; those on the cultivated land grew away from those on grass in a remarkable degree, and bore fruit the second year, while the others did not bear for three or four years. Apples are raised entirely from grafts. The tendency to reversion in this plant, in common with others of a fruit-bearing character, renders it impossible to depend upon plants raised from seed, or upon obtaining like from like. If the pips of the best sorts of apples are planted, they reproduce heterogeneous varieties. When chance has developed a prodigy, it is well known to fruit-growers that this can only be surely perpetuated by scions or grafts. Mr. Knight in his 'Pomona Herefordiensis,' described a method of raising new sorts, by crossing varieties by artificial impregnation. Mr. Knight certainly produced new sorts, but it is questioned whether they were not the results of chance or of fecundation by insects. Upon this point the leading pomologist of the day lately made the following communication to me. "I had endeavoured to raise seedling apples by artificial impregnation: having kept them in pots under glass, I have been able to preserve them from any other fecundations, but the plants have not yet borne fruit." There has been a fallacy prevalent, that trees raised from grafts do not survive the parent stock—that when an apple-tree dies all those trees that have been propagated from scions taken from it die in mournful accord. Mr. Knight, who was President of the Horticultural Society in the latter part of the last century, firmly believed in this curiously unnatural provision, and attributed the decay of the best sorts to its action. "The Golden Pippin," he wrote, "is in the last stage of decay, and the Styre and the Fox-whelp are hastening rapidly after them. I think I am justified in the conclusion that all apple-plants propagated from the same stock partake in some degree of the same life, and will attend it in the habits of their growth, their maturity and decay, though they will not be affected by any incidental injuries the parent trees may sustain after they are detached from it."*

The naïveté of this illogical statement is amusing. If an apple-tree die peacefully in its bed, having come to a green old age, its offshoots forthwith one and all decay. If, however, a tree is blown or cut down, the offshoots are not expected to commit suicide. Many generations of original trees have died and their descendants flourish yet. The Golden Pippin still exists in Kent, and the Styre and Fox-whelp are still plentiful in Herefordshire, in spite of Mr. Knight's funeral sermon in 1797.

Notwithstanding this *reductio ad absurdum*, there can be no doubt that apple-trees produced from cross-fertilised seed would be more vigorous and fruitful than those reared in the usual way, from a long series of stocks propagated by scions. This process is certainly unnatural, though it is convenient, in consequence of the tendency to atavism inherent in most plants that have been improved by selection. Artificial fecundation is a delicate operation, requiring careful manipulation and nicety of management, which prevent its general adoption. It is true it is practised in a rough way by the peasant girls of St. Valery, who go forth armed with apple-blossoms to *faire ses pommes*, to fecundate a peculiar sort of apple-tree whose flowers are devoid of stamens; but this is done to secure fruitfulness without reference to propagation. Mr. Darwin shows most clearly in his recent interesting work† that cross fertilisation of plants improves them in most important points, and that continuous self-fertilisation through many generations tends to gradual degeneracy. The conclusions arrived at by Mr. Darwin, after a most elaborate exposition of experiments upon various plants, are, "that cross fertilisation is generally beneficial, and self-fertilisation injurious. This is shown by the difference in weight, height, constitutional vigour, and fertility of the offspring from crossed and self-fertilised flowers, and in the number of seeds produced by the parent plants. . . . . After plants have been propagated by self-fertilisation for several generations, a single cross with a fresh stock restores their pristine vigour; and we have a strictly analogous result with our domestic animals."

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* 'A Treatise on the Culture of the Apple and Pear.' By T. A. Knight, Esq. 1797.

† 'The Effects of Cross and Self-Fertilisation in the Vegetable Kingdom.' Darwin. 1876.

Very curious notions have also been extant from very early days as to grafting. Pliny gives a graphic account of a grafted tree which was covered with all kinds of fruits—nuts, berries, grapes, pears, figs, pomegranates; but the tree did not live long is his conclusion. Lord Bacon also gravely speaks, in his 'Silva Silvarum,' of apple scions grafted upon a colewort, which produced great flaggy apples. Kentish growers now generally discredit the absurdities as to grafted trees, and attribute the decay of some old sorts, as the Ribston Pippin and the Nonpareil, in particular places, to the exhaustion of essential elements in the soil,* to bad treatment, to constitutional delicacy, and liability to blight and canker. To these causes may be added the change in the temperature, to which allusion has been made. The crab is the proper stock to graft apples upon, but as the supply of these stocks is limited, the best stocks are selected from those that have been raised from pips for that purpose in a nursery, and are grafted with scions of the kind required. The stocks are chosen from those sorts which have clear, hard stems, and are moved into the orchard when they are from 4 to 5 years old. The process of grafting requires much care and nicety, but as this has been so elaborately treated in a former number of this Journal,† it is not necessary to describe it again. Most growers cut the young tree hard the first year it is planted out, as this is supposed to favour root development. A practical and most successful grower, however, objects to this practice, considering "that the tree has enough to do to establish its roots without being weakened by cutting." For the first few years the young apple-tree should be pruned so as to keep the middle well cleared out and the leading shoots as level as possible. When the tree is well established slight pruning will be necessary once in two or three years. Not nearly enough attention is paid to pruning the trees after they have become fair sized. Now and then a raid is made upon those that are most bushy, which are hacked and cut about unmercifully, and it is not strange that apple-trees of the best sorts, invariably the most delicate, decay prematurely. Very few growers prune their apple-trees scientifically, or manage them thoroughly in other respects. Here and there a plantation may be found where the trees have received systematic and proper treatment from the date of planting, where good fruit is produced in abundance; and it is asserted confidently that the land in Kent really suitable for apple-growing may be made to yield fruit not much inferior in quality to the traditional Nonpareils, Scarlet Nonpareils, Golden and Ribston Pippins, and other sorts, whose sweet memories linger yet in the recollection of apple-loving octogenarians. To insure this, however, there must in most cases be a fresh start; the land must be unexhausted, the management more skilful, the treatment altogether more liberal. The pruning and clearing out of large apple-trees which have never been properly pruned, must not be done *per saltum*,—at one fell swoop,—but should rather be extended over several years. If large trees that are embarrassed with branches and filled up with "spindly" shoots, are cleared out at once, canker will certainly be produced in those of a delicate nature, and the most hardy sorts will be seriously weakened. It is better to prune apple-trees in the autumn, as soon as the fruit has been gathered, because it is more likely that fruit-buds will be developed from pruning at that season than after winter cutting, which usually tends to create comparatively unproductive wood. The pruner of trees crowded with wood must aim at gradually cutting the oldest superfluous branches, so that each branch left may stand out by itself and get a full share of air, light, and sun. If the fruit-grower employ only ordinary labourers to prune his trees, he should examine each tree himself, and mark with chalk those branches which he thinks should be cut away. In the case of young trees that have been properly trained, and of older trees that have been reduced to a proper state by gradual pruning as above described, the amount of pruning required is very trifling. The fruit in most sorts comes upon "spurs," or short twigs, on wood that is at least two years old, generally from buds that are covered till late in autumn with clusters of dead leaves. The chief objects are to ensure a proper supply of these fruit-bearing spurs, and to keep them from being crowded and starved out by unfruitful shoots or suckers that grow out on all sides in many sorts. There are a few varieties, however, in which the fruit is grown upon slight shoots. These require thinning out, and shortening, if possible, to prevent the fruit from injury from wind.

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* "When in an old orchard the trees are worn out, I should not recommend it being replanted at least with the same kind of fruit-trees. It will be better to select a new field, and fresh unexhausted soil"—Mr. Cadle, 'Worcester Prize Essay on the Management of Orchards,' 'Journal' R. A. S. E., vol. i. 2nd series.

† 'On the Planting, Management, and After-management of Orchards.' Mr. Cadle, vol. i. 2nd series, 'Journal' R. A. S. E.

Cultivation.—Cultivated fruit-plantations are seldom manured with farmyard- or stable-manure, as from its bulk it is difficult and expensive to put on land thickly covered with fruit-trees. Shoddy is very largely used, at the rate of from 1 to 2 tons per acre, costing from 48*s.* to 100*s.* per ton, according to its percentage of ammonia.* This is easily got in, and suits fruit-trees well. Rags, both "mixed" and "woollens," form a capital, easily-applied manure; the quantity put on and the cost are about the same as in the case of shoddy. Fish-manure, rape-dust, and the refuse from furriers' and tanners' shops are all good manures. I have tried superphosphate of lime without much apparent benefit. From kainite of potash put on fruit-land, at the rate of 7 cwts. per acre, it was thought that good results followed, though the effect of this manure could never be traced when applied for other crops; for apples, like hops, absorb an enormous quantity of potash from the soil.

All manures are put on in the winter, and the land is dug afterwards with the Kentish "spud" which is used in hop-gardens, having four flattened tines, as early in the winter as possible, before any bloom-buds are developed, so that the diggers may not injure them and rub them off. The plantations, or "plats," as they are locally termed, are hoed over with plate-hoes two or three times during the summer to check the weeds, which grow luxuriantly in the shade of "melancholy boughs."

Many large fruit-growers in East and Mid Kent sell the fruit on the trees by auction or private contract to middlemen, who, making fruit-buying a regular business, thoroughly understand the picking and packing of fruit, and the best time and place to sell the various kinds. Sometimes they are salesmen, or connected with salesmen in the London markets, who are well versed in the mysteries of the trade. This saves the growers much trouble, as they are generally busy with the all-engrossing hop-harvest when the apples, pears, plums, and nuts require attention. This is not so much done near London, where hops are not grown to any extent.

Diseases.—Besides canker, mainly caused by injudicious pruning, to which Ribston Pippin, Golden Pippin, King Pippin, and other delicate sorts are specially liable, a plague of caterpillars appears occasionally just as the trees are beginning to bloom. Twice within the last twelve years they have stripped the trees in certain situations of every vestige of blossoms and leaves. The caterpillars invariably follow a long spell of cold east wind, appearing first on the trees unsheltered from its influence, showing that their juices have been changed by it, and rendered grateful to the tastes of the invading hosts. Washing the bodies of the trees with quick-limewash in the winter is adopted to destroy the eggs that are deposited in the summer under the bark, as these eggs contain the destructive larvæ or caterpillars.

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* I have had analyses of shoddy from Dr. Voelcker, in which the amount of ammonia has varied from 5 to 11 per cent.

Old trees, and young trees on some soils, are overspread with varieties of grey lichens, which cover the trunks, ·the large branches, and even the small boughs and twigs. These lichens are epiphytic, deriving their sustenance from the carbonic acid and moisture of the air,* and not in any degree from the tree. Two specimens of these lichens sent to Mr. Carruthers have been identified by him as *Ramalina fastigiata* and *Evernia furfuracea* respectively. Mr. Carruthers is of opinion that lichenous growth is not in any way injurious to the tree, as he believes that it is not found upon the younger branches, whose stomata still absorb carbonic acid. It may, however, be very frequently found even upon the smallest branches and twigs of apple-trees growing on the Kentish rag, and must tend to check, if not entirely to cut off, the supplies they would otherwise take in from the air. Apple-growers believe that it is most injurious, and that a tree cannot be perfectly healthy when covered with it. They send men to throw up quantities of quick-lime with scoops, like flour-scoops, fastened to long poles, into the trees in damp weather. This adheres to the lichens, quickly burning them up, and the tree is made clear and free. Salt water was recommended to check lichenous growth, in a paper read at the Maidstone Farmers' Club, as it had been noticed that trees near the sea-coast are perfectly free from them.†

Sorts of Apples.—The chief sorts grown in Kent are, commencing with dessert apples, the Ribston Pippin—*facile princeps* among apples—now unfortunately a somewhat shy bearer. The King Pippin is much grown in Mid Kent and the Weald; this is a handsome apple when well grown, but it is inclined to be specky on the rag-stone, though doing better on the Weald clay. Joanettings and Summer Pippins, early apples, are also grown and bring good prices. Red Quarrendens, Farleigh Pippins, Pearmains, Nonpareils, Golden Knobs, which ordinarily keep well until apples come round again, bringing high prices in the "Garden," are found in most Kentish plantations and orchards.

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* Carpenter's 'Vegetable Physiology,' section 739.

† 'A Treatise on Fruit-growing Commercially.' By F. Robson, Linton Park.

The Court of Wick; the Margel, whose flavour is nearly equal to that of the Ribston, and, as Dr. Hogg remarks, is of a better size for dessert, is too shy a bearer, and is not therefore extensively grown. The Blenheim Orange, a large handsome apple, is much grown near Maidstone and in the Weald. Cox's Orange Pippin has been planted extensively of late. This is a high-class apple for dessert from November to January, supposed to have been raised from a pip of a Ribston Pippin.*

The principal cooking-apples grown in Kent are, Keswick Codlins, Gooseberry Pippins, Hawthorndens, Northern Greenings, Wellingtons, Winter Queenings—all valuable sorts; the Golden Noble, Lord Suffield, a very fine flavoured, early bearing sort. Tower of Glamis and the Manxs Codlin are chiefly planted now. In most of the old apple-orchards there are several other sorts of little value, such as the Gough—an acid and very low-class apple, but an abundant bearer. Cider is but little made in Kent now; its quality is comparatively poor, and the natives wisely prefer beer. The custom of giving drink to labourers is happily not much observed in the county, and there being but little demand for cider, growers send "windfalls" and low-class apples in barrels to London, where they find a sale at some price for the "smashers," as low-class jam makers are styled in costermonger parlance; though, as a correspondent remarks, "since the Adulteration Act there has not been such a demand for rubbish."

As many as 500 bushels per acre have been grown in plantations where the trees were in their prime. Taking an average of seven years of the average apple-growing land in the county, the crop per acre per annum would be about 130 bushels. The average price per bushel for apples home to the grower, for the last ten years, has been about 2*s.* 2½*d.*; the expenses of picking, packing, carriage, commission, and return of sieves, amounting to about 1*s.* 4*d.* per bushel, having been deducted. For the preceding ten years, the average price, clear of all these expenses, was about 1*s.* 10*d.* per bushel. The annual yield per acre of the orchards under grass must be regarded as being 20 per cent. larger than that of the plantations in respect of apples; but the average annual yield of both taken together amounts to about the quantity of bushels stated above. The fruit-growers in Kent do not appear to have tried growing, upon a large scale, apples and pears on low bush-trees, obtained by working upon true Paradise stock, whose influence tends to dwarf the habit of growth, and to produce fruit abundantly. These bushes can be easily pruned, and root-pruned if thought desirable. There are several plantations of these near London, one notably at Chiswick, belonging to Mr. Dancer, who grows quantities of the finest fruit upon this system, which it is thought might be adopted successfully by the large fruit-growers in Kent.

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* Dr. Hogg's 'Fruit Manual.'

PEARS

are not systematically grown on a large scale in Kent, and are not attended to by any means as they should be. They are grown more in East Kent than in any other part of the county. Many of the old trees are of indifferent kinds, whose fruit cannot compete with that grown abroad, and is frequently a drug in the market. The chief sorts grown are the Chalk, a second-rate pear, Doyenné d'Eté, Beurré de Capiaumont, Chaumontel, Catillac, most excellent for cooking, Williams's Bon Chrétien, Marie Louise, Hazel, Beurré Rose, Bergamot, Duchesse d'Angoulême, the Seckle, having a fine aromatic flavour, and two or three common early pears whose names are not known. There are signs that fruit-growers are bestowing more care on the cultivation of pears, and are planting good sorts that will ripen in due rotation. Good pears generally command high prices, as those who have to buy them for dessert know well, for it is difficult to get any good-looking pears under 6*d.* to 8*d.* each, and such pears cost but little more to grow than the small, hard, indifferent sorts, that take up space in many Kentish orchards. Pear-trees are planted with apple- or cherry-trees, and occasionally by themselves with bushes under them. They require little pruning after they are well established, and bear spud-cultivation as well as apple-trees, though they do better on grass than on land that is cultivated.

CHERRIES.

Fuller says in his 'Kentish Worthies' that "cherries were fetched out of Flanders, and first planted in this country by King Henry VIII."[*] Probably it was the excellent sort known as the Flemish cherry that was "fetched out of Flanders," which is, as Mr. Darwin remarks, "a very odd-looking fruit, much flattened at the summit and base, with the latter deeply furrowed and borne on a stout, very short footstalk."[†] Cherries were brought to Kent by the Romans; and though some authors say they were lost in the Saxon period, and restored in the reign of Henry VIII., this appears to be an error.[‡] Kent has certainly always been famous for cherries, and nothing can be more beautiful than a cherry-orchard in full blossom, with the masses of white clusters covering the trees, which look from a distance as if wreathed with snow. Cherry-trees invariably have a great wealth of blossoms, which are exposed to the proverbial changes and chances of the fickle spring season. They come into blossom in Kent about the same time as the blackthorn —from the 6th to the 25th of April—and they require suitable weather at the time of fecundation; neither too dry nor too wet, nor too much sun. "A cold blow suits cherry bloom," say the rustics, and this coincides with experience, and the physiology of the process of fecundation. "Moisture," writes a friend, "is absolutely necessary for the prolongation of the pollen tube. If the sun is too powerful, the stigma of the pistil is apt to become scorched, and the natural moisture being lost, the pollen tube is undeveloped; on the other hand, should the pollen grain be exposed to wet from rain just as it becomes ripe, and before it reaches the stigma, the pollen tube will be developed in a situation where it can never reach its natural destination in the embryo sac." To illustrate this: the cherry-trees were in full blossom about the 10th of April, in 1876, when the weather was very wet, with heavy rain and snow-showers: the crop of cherries was very short indeed. In the previous year the blossoms were in full beauty about the 22nd of April; though the weather was cold, it was dry, and a very large crop of cherries was grown. Cherries are grown upon grass-land, principally in the eastern part of the county between Chatham and Canterbury. There are a few orchards near Maidstone, but they are becoming few and far between. The trees are planted at first upon cultivated ground, having between them hops, fruit-bushes, or plums, which are taken out after a few years, and grass-seeds sown. The cherry-trees are set at a distance of 27 feet to 33 feet apart, which would give from 40 to 60 trees per acre. In some cases the landlord finds the standard trees, and the tenant pays for the labour and finds the bushes, which soon come into bearing. The rent of cherry-orchards is about 8*l.* per acre upon an average. Good managers never mow grass under cherry-trees, but feed it with fatting sheep, and manure it with twenty to thirty loads of London dung per acre. Cherries are "worked" on the "Gaskin" or wild cherry stock, which is found in abundance in the woods. This wood is harder than that of the "Honey Red," and not so liable to gum. Pruning is done tenderly and carefully for the first two or three years, after that very little is requisite. A large grower writes, "I am very reluctant to prune cherry-trees after the first year or two."

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[*] Fuller's 'History of the Worthies of England, vol. ii. p. 11.

[†] 'The Variation of Animals and Plants under Domestication.' Darwin, vol. i., p. 369

[‡] Phillip's 'Companion for the Orchard,' p. 78.

The chief sorts cultivated are the Adams' Crown Heart, the earliest sort, allied to the White Heart according to Dr. Hogg, but a better bearer. The Black Heart, a very old standard cherry, the Elton Heart, Black Eagle also an early sort; May Duke, Turkey Heart, Frogmore, Early Bigarreau, Waterloo, also early; the Early Purple Gem, Bigarreau, a large, firm-fleshed, somewhat late and most saleable cherry; Morello, used for making cherry-brandy; Kentish and Flemish, both of which are admirable for cooking and bottling, having a fine sub-acid flavour, and a brilliant colour. Mr. Darwin remarks upon the first-named of these cherries that "the stone adheres so firmly to the footstalk that it could be drawn out of the flesh; and this renders the fruit well-fitted for drying."* Nothing, it must be added, can be more grateful to convalescent patients than the flavour of dried "Kentish" cherries. Mr. Webb, in his paper on 'Fruit Cultivation,' remarks, "It is odd that, although our great propagators have added of late years so many excellent and useful varieties to the stock of apples, pears, and plums, yet with cherries we have had but few additions."† Picking is principally done by women, who mount the tall ladders with great agility, and get from 9*d.* to 1*s.* 3*d.* per sieve, containing each about 48 lbs. of fruit. A large proportion of the cherries are sold upon the trees by public or private sale in June and July to fruit-buyers, who take all risks and further expenses upon themselves. Mr. Webb gives a table of prices made at sales by auction of certain well-known orchards. For instance, he states that one large orchard of 88 acres averaged 19*l.* 9*s.* 6*d.* per acre for fourteen years; another, of 3 acres, has made 37*l.* 4*s.* per acre for thirteen years. From trustworthy information from another source as to seven typical orchards, it is shown that the fruit growing upon one of these realised by auction 27*l.* 14*s.* per acre in 1874, 24*l.* per acre in 1875, and 41*l.* 2*s.* per acre in 1876; giving an average of 30*l.* 18*s.* 8*d.* per acre for the three years. In another case 43*l.* per acre was obtained in 1874, 33*l.* 10*s.* in 1875, and 32*l.* 8*s.* in 1876; showing an average of 36*l.* 6*s.* per acre for three years. This, it must be remembered, is for the produce, clear of all expenses of picking, packing, carriage, and commission. The expenses up to the time of sale, for rent, tithe, ordinary and extraordinary—for all fruit-land pays an extraordinary tithe-charge, varying from 6*s.* to 8*s.* per acre, in addition to the usual charge—rates, manuring, maintenance, pruning, amount to from 12*l.* to 14*l.* per acre, from which must be deducted the value of the grass under the trees. For the last twenty-six years the average price made in London for cherries grown in Kent has been about 8*s.* per sieve. Deducting an average cost of 2*s.* 8*d.* per sieve from this price for all expenses after the fruit is grown, a balance of 5*s.* 4*d.* per sieve is shown. The highest prices made for cherries during the period alluded to were in 1876, and the lowest in 1875. And it is curious to note that, in spite of foreign competition, the average price per annum obtained for Kentish cherries during the last ten years is nearly 1*s.* per sieve higher than the average of the preceding decade.

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* Loc. cit. *ante*, p. 12.

† 'Transactions of the Institution of Surveyors,' vol. viii. pt. 2.

All cherries, except the Flemish, Kentish, and Morello cherries, which are used for tarts, preserves, and liqueurs, are bought by fruiterers and costermongers for retailing and hawking for eating purposes, as they do not make good jam.

FILBERTS.

The filbert, *Corylus avellana*—a corruption of "full beard," as it was originally styled, to distinguish it from smaller nuts,—so highly appreciated at dessert, is cultivated extensively in the neighbourhood of Maidstone. It is not grown to any extent beyond a circuit of 7 or 8 miles round that town, though there are a few plantations at Ightham, about 13 miles north-west of it, and in the West Kent fruit-growing district. It does well upon the best soils of the ragstone, but thrives exceedingly upon the Atherfield clay, locally called the "coomb," which has been described as follows by a practical farmer: "There is a very narrow belt of land running along the escarpment of the ragstone, which, though of a very heavy and adhesive texture, is astonishingly productive in hops, fruit, and grain."* The situation best suited is a southern slope, sheltered from rough winds, which are apt to snap off the delicate shoots in the early spring and bruise the blossoms. Filbert-trees are always grown on cultivated land, planted under standard apple, pear, and plum trees. Fruit-bushes are generally planted as well. Filbert-trees are set about 13 feet apart, giving 257 trees to the acre; and are invariably propagated by suckers obtained from old trees, and put in nurseries until they are two or three years old, being carefully pruned and trained to the required form. The first operation in an established filbert-plat is to open a small trench round each tree, to get the suckers or "spawns" from off the roots and lower part of the stems. Rags, shoddy, fur-waste, sprats, "sheep-trotters," hop-bines, are used for manure. Digging the land is done with the spud peculiar to Kent, before Christmas if possible; before the trees are pruned, that the bloom, which appears very early, may not be rubbed off. Pruning or cutting filbert-trees is a most elaborate process. Each branch is examined by the tree-cutter, who leaves the finest young wood that he sees, or ought to see, at a glance if he knows his business, to be bloom-bearing, and cuts away all wood of coarser, older growth, comparatively unfruitful. The "bloom," or cluster of pistilline flowers, is remarkably pretty, like a tiny scarlet star upon the extremities of the shoots. It is fertilised by the "catkins," as the stamineous flowers are called, growing on the same branches, some of which are left by the judicious cutter. After the pruning the trees look mere skeletons, as may be seen by the appended illustration, which also shows the catkins in due order. A stranger who had seen filbert-trees thus naked and forlorn in the winter, would be surprised to see them in September with a wonderful wealth of leaves, branches, and nuts upon them. A typical tree has a stem of about 2 feet in height, from which the branches are trained to spread out laterally, and to form a centre of a saucer-like shape, with a diameter of 7 or 8 feet, and a height of about 6 feet. After pruning, nothing is done until July, when most growers have the long suckers taken from the middle of the trees, and the leading shoots are broken off to relieve them from the burden of supporting unproductive wood. Mr. Webb states that he saw some filbert-trees near Maidstone which had grown 40 lbs. of nuts on each tree.* A crop of a ton, or even more, is occasionally grown; but the average yield may be set at about 8 cwts. per acre. Filberts are frequently sold on the trees, as the growers have hops to attend to, and do not want the trouble

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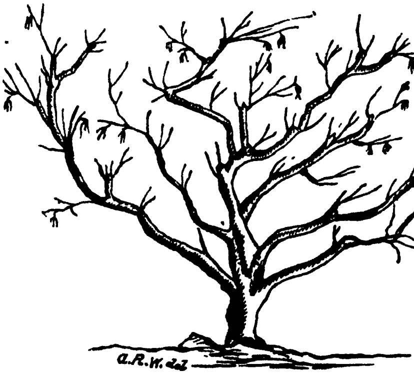
* "Farming of Kent." Buckland, 'Journal' R. A. S. E., vol. vi. p. 279, 1845.

Fig. 1.—*A Pruned Filbert-tree.*



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* *Op. cit.*, p. 42.

of picking and selling them at the busiest time of the year. They are for the most part sent to Covent Garden, in sieves which hold about 28 lbs. of green, and 40 lbs. of ripe or harvested nuts. It is customary to send a portion of the crops to London when the bunches are quite green, and the kernel not by any means fully developed. There is a certain demand for these, as they look well on the table, though at this time they have but a mere *soupçon* of the true filbert flavour. When filberts sell well at this stage, some growers send their whole crop up, as the weight of green nuts is nearly double that they would have if duly harvested. Prices of filberts range from 5*d.* to 1*s.* per lb., according to the supply. They are not much influenced by the competition of foreign nuts, none of which have the flavour or the appearance of the genuine Kentish filbert, although the quantity of nuts of all kinds imported is very large. The value of the imports of this duty-free fruit, which chiefly comes from Belgium, France, and Brazil, amounted to 584,325*l.* in 1875, as against 408,291*l.* in 1871.*

The Kent cob-nut, or "Lambert's filbert,"† is superseding the old-fashioned filbert in a degree, and is generally preferred for new plantations. It is a much larger nut than the filbert, with a thicker shell, and is a more hardy and more abundant bearer. As these trees do not thrive so well under standards as filberts, they are now generally planted by themselves, with bushes under them, or with plums, damsons, or half-standard apple-trees. They are treated in the same way, requiring, perhaps, to be cut a little harder than filbert-trees. A casual observer would not notice the difference between cob and filbert trees, but their leaves are different; the whole growth of the former is more vigorous, and its "bloom" or pistilline cluster is darker than the filbert bloom. As a rule cob-nuts make rather higher prices than filberts.

"BUSH" OR "UNDER" FRUIT.

A brief description of the various kinds of fruit known as bush, soft, or under fruit must be given, as these form a very important part of the fruit grown in Kent; commencing with

Gooseberries.—The gooseberry bush is planted under filbert, apple, and other fruit trees, and does remarkably well upon the loam, "pinnock," and the lighter soils of the Hythe beds. It thrives best in fairly dry land, and is grown extensively in the neighbourhood of Maidstone, paying very well on suitable land. It is also grown in East Kent under apple and plum trees, and more largely still in West Kent. These bushes are usually set about 6 feet apart under full standards and filberts, or 1210 plants to the acre; and 5½ feet apart, or 1440 plants to the acre, when put by themselves or under plums or damsons. Growers having short leases, or growers whose landlords decline to find standard trees, frequently make plantations of gooseberry or currant bushes alone, which come to bear in two or three years and pay well, if well managed, for a few years without renewal. Mr. Webb relates that a grower near Maidstone made 100*l.* in one year, from one acre of gooseberry-bushes.* The average return from an acre in full bearing, is probably about 38*l.*, from which must be deducted at least 22*l.* for expenses of all kinds.

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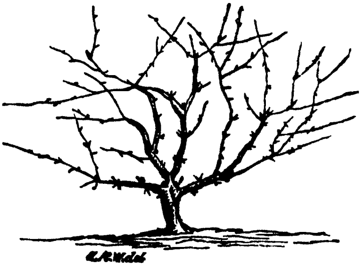
* The 'Returns of the Board of Trade for 1876' had not been published when this was written.—ED.

† So called from a Mr. Lambert, who introduced it to the Horticultural Society in 1812.

The method of propagating these bushes is to select straight portions of the leading shoots cut off in the winter, to reduce them to about 8 inches in length, and to set them in rows in a nursery. They are kept well trimmed, and are ready for planting out in two years or so, being trained in a cup-like form, from one stem about 10 inches from the ground, as the accompanying illustration shows. All rank-growing branches are cut away every year, and a supply of moderately-young wood is reserved for fruit-bearing. The land is dug in the winter, and manured with rags, shoddy, sprats, &c. It is hoed two or three times in the summer. Though the sorts of gooseberries are legion, amounting to over 300 varieties according to Mr. Darwin, Kent growers chiefly grow the Whitesmith, Warrington, Lancashire Lad, Crown Bob, Yellow Rifleman, Velvet White, Golden Drop, and Monarch. Should the demand be good, many of the gooseberries, especially the Whitesmith and Crown Bob sorts, are sent up green for bottling and cooking, directly they are large enough. The Warrington, a medium-sized red berry that ripens about the latest of all, being most excellent for preserving, having a sub-acid flavour, is very largely grown. Besides these qualities it has a peculiar arrangement of its thorns, which are so disposed that they serve to protect the buds in the winter from the onslaught of small birds, which are very fond

Fig. 2.—*Pruned Gooseberry Tree.*



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* *Op. cit.*, p. 42.

of them, and do infinite mischief in plantations near woods. Bullfinches are especially troublesome in this respect, so much so, that fruit-growers set a price of 2*d.* each upon their heads. Red worsted is often put over the bushes to frighten the birds away.

Currants.—Red, white, and black currants are grown in great quantities in Mid and West Kent, and to some extent in East Kent. Black currants have been lately planted to a considerable extent in the Weald of Kent Currants are usually grown under fruit-trees: they are, however, occasionally put by themselves.

The red currant is indigenous in this country according to Phillips.* There are not many sorts of it. Dr. Hogg mentions only five or six. The Dutch, Raby Castle, and the Scotch,—which is by far the best, though it is not mentioned by Dr. Hogg,—are generally planted in Kent. This fruit is not so profitable as the gooseberry. The bushes are raised from cuttings, and are cultivated in the same way as gooseberry-bushes, only that in pruning them nearly all the growing wood is cut away, the fruit-buds coming on small shoots or "snags" thrown out each year from the older wood. The inside of the bush is therefore kept cleared well out to allow air and light to get to the bunches on the inner side of the fruit-bearing branches. Red currants are in great demand for bottling, for jam, and for currant jelly; they are packed in sieves weighing 48 lbs., and make from 2*d.* to 2½*d.* per lb.

White currants are not much grown. They ripen well under even the darkest shade of standards. They are only used for dessert purposes.

The black currant is a most profitable fruit when the bushes are planted upon suitable soil. It is very much grown upon heavy, sticky land, which can hardly be too wet. The bushes are raised from cuttings, and their growth is very rapid. Pruners cut away the greater part of the old wood, as the fruit comes best and largest on young wood. No wood is left over two years old. The wood does not grow from a stem, as in the case of other currant and gooseberry bushes, but from a "stub" or stock close to the ground, like the Ribes in shrubberies. Only two sorts are grown—the Black Naples and the old Black. This fruit always sells well for jam, jelly, and lozenge-making. About 3*d.* per lb. is the average price of it in London. An average crop of black currants would be at the rate of 3000 lbs. per acre, though as much as 6000 lbs. has been grown per acre upon land planted with these bushes alone.

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* *Op cit.*, p. 130.

Strawberries.—This fruit is largely cultivated in West Kent, and not to any extent for market purposes in other parts of the county more distant from London, on account of its perishable nature. It is not uncommon to find individuals having as many as 100 acres of strawberries in this district, chiefly planted upon the clays of the Thanet beds, in many cases upon grubbed woodland, which suits them remarkably well. An owner of land in this neighbourhood states that poor woodland, whose underwood was never worth more than 7*l.* or 8*l.* per acre at twelve or fourteen years' growth, has yielded as much as 150*l.* per acre when grubbed and planted with strawberries; but this was in the earlier, palmy days of strawberry growing. Clay lands suits strawberry-plants best, though they grow fairly well upon sandy soils, but do not bear much fruit after three years. On the clay they come into full bearing at the expiration of three years, and continue to be fairly productive for six years or so. Strawberry-plants are propagated by the long runners which cover, and strike root in, the ground in the autumn. When it is desired to obtain young plants, these runners are not cut away as usual directly after the fruit has been picked, but are left until small rootlets have been formed at their joints, and then taken up and planted. The price for these is about 5*s.* per 1000. The chief sorts planted are, the British Queen, one of the best strawberries, of great size and fine flavour; Keen's Seedling; Princess Alice, an early sort; Comte de Paris, an early strawberry and an excellent bearer; the Elton Pine; Goliath, one of the best sorts for culture on a large scale; Eleanor, described by Dr. Hogg as "able to endure drought without material injury"; and Sir Joseph Paxton, a large, prolific sort. Previous to planting, the land is well manured and hand-dug to get a level surface, which ploughing and harrowing would not obtain. The plants are set in rows 2 feet 6 inches wide, and about 1 foot 6 inches from plant to plant in the rows, giving about 10,500 plants per acre. The rows are put thus far apart in order that horse-hoeing may be done, and some growers have lately put the plants in 2 feet 6 inches apart each way, which would give rather less than 7000 plants per acre, in order that the horse-hoe might work in all directions, and the expense of labour be much diminished. In an established strawberry-plantation, the "runners" are cut away in the autumn, being generally used for propagation, and the land is dug by hand. In the spring the horse-hoes, and hand-hoes where the plants are set closely in the rows, are continually worked to keep down the weeds. Just before the fruit is changing its colour, the ground is covered with rough dung, or straw cut into 6-inch lengths, laid carefully under the plants to keep the fruit from the dirt, to stimulate the growth of the plants, and to retain the moisture in the soil, which is most essential for the plants. This covering of rough dung also serves for manure for the next season. Strawberries for eating must be picked very early in the morning in order that they may be fresh and firm. They are generally picked by gangs of men and boys, who sally forth at 3 A.M. and leave off at 7 A.M. This matutinal fruit is put into "punnets" containing about 1 lb. weight, which are again packed in deal boxes holding about five dozen "punnets," and sent off by the earliest trains to Covent Garden. For this, which is the *crême de la crême* of the fruit, as much as 5*l.* per box is sometimes realised, or 1*s.* 8*d.* per lb. Women do not pick the best strawberries, as they do not like the very early hours, and their clothes damage the fruit; but they arrange them deftly in the punnets and boxes in a shed or tent close to the field. Some growers sell the produce of their strawberry-plantations to middlemen, who pick, pack, sell, and take all risk, at an average price of 18*l.* per acre. Others make contracts with jam makers to supply them with strawberries at from 18*l.* to 28*l.* per ton. In this case the fruit is gathered at all times in the day, and sent to the jam manufactories in tubs containing 80 or 100 lbs. weight of fruit. The average price of this fruit in London is about 7*d.* per lb. When the price falls below 3*d.* per lb. there is not much profit in its production. Strawberry growing is a very pleasant and a fairly profitable business when carried on under favourable conditions near the metropolis, and it seems hardly possible that home or foreign competition can interfere much with the fortunate cultivators in West Kent.

Raspberries are also largely grown in this part of the county as well as to a small extent near Maidstone and Sandwich. The "canes" are raised easily and quickly from cuttings, and are planted between currants and other bushes; or by themselves, about 15 inches distant from each other, in rows wide enough apart for purposes of cultivation, being treated as regards cultivation and manure in the same manner as fruit-bushes. When this fruit is grown on a large scale, stakes and espaliers are dispensed with, the canes are cut down in the winter to about 3 feet in height, the old wood that has ceased to bear is cut away, and as much of the young wood as is not required. Care should be taken to retain those canes that are stoutest and have short joints. The fruit is picked by women and children, and is usually sold to contractors at from 18*l.* to 26*l.* per ton. It is packed in tubs in order that the abundant juices may be preserved. Some of the largest, firmest, and best fruit is sent to market in punnets for dessert, but the bulk of it goes to the jam manufacturers. The average price of this fruit for the last six years in London has been about 3*d.* per lb.

Plums and Damsons.—These are grown more or less in all the fruit-growing districts of the county. Growers in East Kent prefer the forward Orleans, Magnum Bonum, Blue Diamond, Victoria, Dauphin, Mussel, Early Rivers, and Washington. Black plums sell the best. The trees are planted between cherry and apple trees, or are set in plantations by themselves with bushes under them. Green gages grow especially well in the neighbourhood of Rainham, near Sittingbourne, the fruit being very large and of a particularly fine flavour and colour. A tradition exists that 100*l.* per acre has been made in one year on a piece of land near Chatham planted with greengages. Plums generally sell well. The average price of plums in London is about 19*l.* per ton. In 1876 they made from 28*l.* to 32*l.* per ton; in 1871, only from 12*l.* to 14*l.* per ton. There is a famous damson, known as the "Crittenden" damson, that has been planted to an enormous extent in Kent during the last 20 years. This is propagated by suckers, or "spawns," which come up all round the trees, and yield fruit after their kind without being grafted, like the "Pershore Plum," which is general in Worcestershire. After these suckers have been planted out for two years they begin to bear. This kind of damson is amazingly prolific, and the fruit brings high prices for jam, bottling, damson cheese, and, as some say, for manufacturing port wine. Plum-trees, like cherry-trees, do not require much pruning, and are inclined to "gum" and decay if the knife is too freely used. It is merely necessary to cut back any over-vigorous growth that may get too much ahead, and to clear out wood that crowds up the inside of the trees. Plum-trees do not do well in exposed situations, as their roots are so near the surface that they are likely to be blown down by wind.

Conclusion.—The details and descriptions that have been given of fruit-growing in Kent will serve to show that it is a pleasant, interesting, and fairly profitable occupation, as well as that some parts of the county are eminently suitable for this purpose in regard to soil, situation, and climate. It has been remarked that considerable improvement has been made of late years in the methods of planting, cultivating, manuring, and pruning fruit-trees, and that more attention has been given to the selection of varieties; though in these respects there is still much to be desired. Kentish fruit-growers do not use their skill, energy, and capital sufficiently in the production of high-class fruit. They are satisfied rather with the production of quantities of common kinds, such as gooseberries, currants, cherries, damsons, which do not entail much skill or care, of which fruits there is either a general glut or a general comparative scarcity in the market. Fine-grown apples, choice dessert pears, large brilliant plums, are always in request and bring remunerative prices; but it cannot be expected that such fruit can be grown by the systems of management that have, as a rule, until recently prevailed. The producers of fruit have been too much mere fruit-farmers, having practised the rough-and-ready ways adopted in their cultivation of ordinary crops. There are signs that all this is being changed, and that proper attention is being bestowed upon details, upon minutiæ which are essential to ensure success. It is possible that foreign competition, which is increasing year by year, coupled with a largely increasing home production, may affect the profits of growing "soft" fruit and the more common kinds; but, with regard to fine dessert fruit, it is not likely that there will be too much if the growers have a due regard to the selection of sorts that will succeed each other in regular rotation, and keep their fruit at home until it is fit for market. It is too much the custom to send all fruit, that ought to be kept, away when it is gathered, on account of the trouble and uncertainties of "harvesting" at home. If the growers will not undertake this they cannot expect the full return from their fruit-land, nor will the public have a steady supply of fruit fit for table. A very great waste of fine fruit takes place because so little is kept at home by the producers until it is ripe; and much goes to the smashers that should fetch full dessert prices in its due season. Many complaints have been made lately of the scarcity of fruit in many places, and it was justly remarked by Mr. Bartley,* that many of the poorer classes never taste fruit, which is so grateful and even necessary to some constitutions. This scarcity is due to the centralisation of the fruit supply in London and other large towns, caused obviously by the reason that the sale of consignments is practically certain at some prices—the market-price of the day. Soft fruit in many cases will not bear a second journey, and it constantly happens in the season that the costermongers are traversing London, taking fresh fruit to the slums and alleys at the cheapest rate; for instance, selling fine Bigarreau cherries at 1½*d.* per lb., while the inhabitants of the towns and villages within twenty miles of the metropolis, even in fruit-growing districts, can hardly get fruit at any price. Jam makers always stand ready to take immense quantities of all kinds of fruit in plentiful seasons, as the price is low and the jam will keep for a "rainy day." It is true that fruit of all kinds goes from London to the largest northern towns, but the risks of the fruit not finding a market are few where the population is dense and jam manufactories exist.

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* "The Cultivation of Common Fruits from a Social and Economic Point of View." 'Society of Arts Journal,' Jan. 19th, 1877.

Fruit-growers can hardly help to remedy this monopoly of soft fruit in thickly populated places, as the article is so highly perishable. They can, however, better regulate the supply of hard fruit, such as apples, pears, and filberts, by a better arrangement of varieties in their plantations, and by forwarding to market only fruit actually fit for consumption; and by doing this they would prevent a great waste of fruit, and obtain far better prices for their produce.

III.—*Straw as Food for Stock.* By JOSEPH DARBY.

THE utilisation of waste substances is a matter which has received profound attention during the past few years. On the farm, no less than in the mill or workshop, there are waste products to be utilised; and wherever turnips, clover, or wheat have been produced, instead of fern, briars, and heather, a highly important utilisation of waste substances cannot but have taken place. But this is only one of several ways in which the farmer may convert material from low and comparatively valueless uses to the accomplishment of highly important objects. A sufficient illustration may be found in the very different treatment the straw of our grain-crops undergoes after the separation of the more valuable part of the produce has been effected. On the farm of one man, it is almost entirely appropriated in soaking up the profuse drenchings of wet yards; on that of another, large additional food-stores become created, which permit the increase of flocks and herds, and a grand increment in the production of mutton and beef. That the one case exhibits a decided waste must be very evident, the other leads to the creation of fresh wealth.

This subject has at different times received very comprehensive treatment in past volumes of this Journal. In 1856 and 1857, Mr. Horsfall published his valuable experiments in feeding dairy cattle, in which straw of different kinds played an important part. In 1860, Mr. H. Evershed, in a Prize Essay, dealt with the question very fully, and embodied many facts and suggestions, which are still of great practical value; and in 1861, Dr. Voelcker produced an elaborate Report on the nutritive properties of straw, in which the distinctive qualities of the different kinds were clearly pointed out, and deductions were drawn from analysis, calculated to awaken attention and influence practical farming. When Mr. S. Jonas subsequently imparted his discovery of the practicability of improving the feeding properties of straw-chaff, Dr. Voelcker, ten years later, in 1871, again brought his scientific knowledge to bear very fully on the subject, so as to elucidate, by analytical proofs, some points important to be known. In 1865 Mr. John Coleman and Mr. Evershed entered fully into the possibility of feeding sheep in the winter entirely on straw-chaff and meal; so that well-nigh every feature of straw utilisation as food, and the advantages to be gained thereby, has been already forcibly delineated. But it is a subject of immense importance, which can scarcely receive too much attention, as it bears very intimately on the practicability of making the land support more stock and yield larger returns of meat.

Dr. Voelcker has stated: "It is undoubtedly a fact that some practical feeders are in possession of the secret of converting considerable quantities of straw into beef." And Mr. Mechi, in his latest published book, reiterates in substance the statement made before the Society of Arts in 1850: "Experience has taught me, and will teach others, that in order to succeed in farming, we must produce a much larger quantity of meat on our farms than at present, and at less cost. In order to do this advantageously, it becomes necessary to consume a large portion of the straw of the farm, cut into chaff, and cook it with meal or ground oilcake. We are thus deprived of the usual bedding, and must find a substitute."

The straw of the farm has always been made, more or less, to serve the double purpose of foddering and littering stock, while in the old times a much larger proportion of it was wasted than now. Arthur Young, in his 'Calendar,' gave very good teaching to the farmers of 1804 as to the use of straw. He said: "The common cases of straw-feeding are of cows, young cattle, or black cattle, just brought in and not yet put to fatting. With regard to cows, the food is certainly insufficient, and lets them down so much in flesh, that when they calve, and are expected to yield productively, they lose a considerable time, and that, perhaps, the most valuable, in getting again into flesh, before they give their usual quantity of milk; but if they have been well and sufficiently wintered, they are half summered, and yield at once adequately. For young cattle it is still worse management, for their growth is stunted, and they never recover it. In so far as regards the quality of the farm-yard-dung, this reasoning becomes still more forcible; for from straw-fed cattle the farmer will, at the end of winter, find, perhaps, a large heap of so poor a quality, that it will go but a little way in manuring his fields; whereas one load of dung made by fat or well-fed cattle, will be equal to two or three of it. The proper food for cows in winter is cut chaff—one-half straw and the other half hay, with a good boil of turnips and cabbages; for young cattle the same chaff, and as much cabbage as they will eat; and the same, or turnips, for black cattle."

Probably many of the readers of this Journal will be surprised to hear that the comparative worthlessness of mere rotted straw as manure was inculcated so early in the century. As for the penny-wise pound-foolish custom of feeding in-calf cows exclusively on straw in the winter months, there are scores of farmers in the dairy districts who still scrupulously adhere to it, and are consequently not only grievously behind their age, but are deficient of the wisdom which was imparted to the world seventy-three years ago, notwithstanding all the practical and scientific aids which have been brought to bear on our feeding systems in recent times. By bestowing 5 lbs. per head per day of cotton-cake on cattle in the strawyard, neither hay, cabbages, nor turnips are necessary. Both in-calvers and young cattle will thrive, and fully support their flesh-condition on this quantity of cake, in addition to the straw diet; and the evil of an impoverished dungheap need not be apprehended. When such important benefits accrue from the expenditure of less than half-a-crown per beast per week in the cost of the cake, it does seem strange that owners of stock should be found at the present day so blind to their own interests as to keep them in a state of semi-starvation, by restricting their diet exclusively to straw-fodder.

But such a policy is scarcely more reprehensible than that of determining to have nothing whatever to do with straw in dieting animals. One of the gentlemen to whom I applied for information, as to the extent that straw is utilised as food for stock in his locality, has been good enough to state his opinion, that it is employed "a great deal too much," being, according to his ideas, "the most extravagant food used." Answering the question, in what way straw should be given to stock, "Not at all," he said; and in reference to the system of the late Mr. Samuel Jonas for making straw-chaff more palatable and better, by causing it to ferment with small quantities of green chaff, he has written: "I think it all moonshine."

How different is the reply of Mr. John Coleman, of Riccall Hall, York, to my queries. Speaking of his own district, he says:—

"As a rule, most of the straw is used for litter, but there are exceptional cases where the largest part of the straw grown on the farm is passed through the animal's body, and I am interested in one case where nearly all is thus used, straw for litter being bought. This is at Lord Wenlock's home-farm at Escrick. There we have only 220 acres of arable land of a light sandy nature, and about 430 acres of pasture. A large number of cattle are reared, and others purchased for feeding, in order to provide a sufficiency of manure to dress 30 acres of potatoes and 40 acres of mixed root-crops (mangolds and swedes), and a third of the mowing land annually. More than 100 head of cattle, 400 sheep, and a large herd of pigs are kept; and by the aid of the chaff-cutter and pulper, with liberal purchases of artificial food, this large head of stock is maintained, and some 50 head of cattle fed for the butcher. The horned stock include a dairy of 20 cows. How best to economise straw for litter is a most important question at the present time, when wheat-straw sells readily at 4*l.* a ton. If we have boxes, then cut litter is decidedly economical. I do not like sparred floors. Cattle rub their hair off, and the skin hardens from the pressure. Care as to the drainage of stalls is very necessary, and a good deal may be done in the way of substituting fern for straw. It is true that the former has very little manuring value, but, if well harvested, it forms a good absorbent for the liquid, and is especially useful as a foundation for the open folds. But, undoubtedly, the greatest economy consists in making the manure under cover, by which at least half the bedding is saved. The great objections are the heavy first outlay, and the fact that, unless great precaution is taken as to ventilation, store animals become somewhat tender, and lose their coats.

"I am quite certain that by the proper use of chopped straw and pulped roots from one-third to one-fourth more cattle can be kept upon a given area of land. I don't know whether sheep could be increased so much, but ewes will eat with advantage a good deal of straw, and, so supplied, economise turnips.

"My own practice as regards cattle is to cut the chaff and pulp daily, well mix, and distribute over the mixture a certain quantity of palm-nut meal, barley-meal, and Indian corn meal, or whatever ingredients are in use."

But Mr. Coleman is an old advocate for economy in the employment of more straw and straw-chaff in feeding stock, as the back volumes of this Journal sufficiently show. At one of the Royal Agricultural Society's discussions, held on June 10th, 1863, introduced by him, he said:—

"The point I would wish to draw your attention to is a more economical system of feeding sheep, so as to increase the returns and leave the land in better condition for corn. This result would, I believe, be effected by reducing the quantity of roots, and using more dry food, such as straw, in combination with a small quantity of artificial food, which will act as a stimulus to digestion. It is calculated by Morton and others that a breeding ewe will consume one-fourth of its live weight of turnips, or 20 lbs. to 30 lbs. a day, of which nine-tenths is water. If we can reduce the roots one-half, and substitute an equivalent in the form of straw and condimental food, at the same time attending to the external comfort of the animal, we shall have achieved a great point. From personal experience I am fully convinced that good straw may be economically substituted for hay in the winter feeding of sheep even without any artificial food, though the cost of the latter is so slight that it can be economically supplied." Mr. Coleman then entered into calculations to show that by giving sheep partly straw-fodder and partly roots while feeding on the land, in the proportion of 1½ lb. of the former per head per day, the value of the manure left on the land would be increased by more than one-half. After attempting to prove that benefit would be derived by the animals also, he gave his opinion that by the addition of a little oilcake there would be a most material gain, and stated that he did not say this without experience. "Two years since," said he, "wishing to economise the roots, we supplied our young ewes with a quarter of a lb. a day of palm-nut meal, with chaff, and a very small quantity of roots, and they throve wonderfully."

Then, again, in his Prize Essay on the 'Management of Sheep Stock,' published in the 'Journal' for 1865, he observes that a much larger number of animals might be kept in many instances by economising the supply of roots with dry food. He says:—

> "Hitherto farmers have supposed that a bellyful of turnips was necessary for a breeding animal, and have based their calculations on their stock of roots that were to be thus wasted. The past winter has taught us to give these roots in a healthier form, eking out the supply by a nice admixture of other food supplied in a palatable form. I have lately inspected a flock of Hampshire Down ewes that did not have a root before lambing. They ran on grassland during the day, being hurdled at night, so as to dress and improve the pasture. Morning and night they got trough-food, consisting of straw and hay-chaff—two-thirds of the former and one-third of the latter—bruised oats, and palm-nut meal. The cost of the artificial food amounted to 2¾*d.* a head weekly. Not one ewe died during the winter, and I never saw animals in a more promising state for lambing."

In another place he says:—

> "The object of this Essay is to point out the best means of increasing sheep-stock. Here, then, is one way. We must make one acre of turnips keep twice as many sheep as hitherto in a far more healthy condition. Last winter in too many cases the difficulty was to find any roots at all; but great and lasting good may be anticipated from the evil then felt. I saw many flocks during the past winter living on damp chaff, with a little artificial food, and doing as well as could be wished, with every prospect of a healthy produce, and plenty of milk. I have long desired to see an economical plan of pulping roots devised, as the animal might then be induced to eat a large quantity of straw-chaff, rendered palatable and nutritious by a small addition of artificial food. Nor would such a system be so extravagant as at first it might appear. Let us assume, by way of example, that our crop of turnips equals 15 tons per acre, and that instead of 20 lbs. per head we give 10 lbs. (amply sufficient), with 1 lb. of straw-chaff and ¼ lb. per day each of artificial food, and it follows that 100 sheep will consume an acre in thirty-three days, and 7 cwt. of extra food will be spent on each acre, besides 1½ ton of straw, so as considerably to increase our produce of corn, besides the chief object of keeping a heavier stock of breeding sheep in a healthy state."

The famine winter for stock of 1864–5, alluded to above, brought flockmasters very generally by sheer compulsion to the straw-stack, which was in that direful season invaluable as affording the only means whereby the sheep-stock of the country could possibly be saved from starvation. Similar cases to the above could be related by well-nigh everybody having to do with agricultural pursuits at that period. Indeed Mr. H. Evershed, in the same volume of the 'Journal,' relates a bold experiment by which he wintered 1500 sheep, although he had scarcely any turnips, their almost entire food consisting of straw-chaff and meal. I had the satisfaction of conducting an experiment of a very similar nature, although on a smaller scale—my lot of wether lambs having not the slightest green food from November until towards the end of April, beyond what little they could pick up from the stubbles; yet they did remarkably well on straw-chaff, bruised oats, and meal, and were sold in May for nearly three times the amount they had cost before winter.

Mr. Coleman has written that flockmasters were taught a lesson then, which they will never forget; but it has been repeated more than once since. The droughty summers of 1868 and 1870, although not equally fatal to the turnip crop, left the supply of roots and hay remarkably short for the succeeding winters, and a very general recourse to straw was again made in those seasons.

The experience, therefore, already obtained is ample to prove not only the practicability of keeping sheep on a winter diet, the bulk of which is straw-chaff, if only a due proportion of highly nutritious food, such as oilcake, meal, grain, or treacle, be used with it; but that sheep will thrive better and be more healthy on such a mixed dietary than any other. The only obstacle to its being more generally adopted in all winters is the expense and labour involved. Farmers, somehow, do not take kindly to the system when turnips and other roots are abundant. To carry it out under these circumstances would require their flocks to be greatly enlarged, and, apart from the question of capital, store stock, as a rule, rises in price whenever keep is abundant, rendering speculative purchases, especially for artificial products, extremely hazardous. There are the turnips, and they require to be eaten, or they will have to be ploughed in for manure: and it is natural that the farmer having a good crop of roots on his land, and a limited number of mouths to eat them, should feed his animals almost entirely on root-pulp, unless, indeed, their health would be thereby placed in jeopardy.

For ewes heavy in lamb, however, a full supply of turnips, with no dry food of any sort as a healthful alterative, must be extremely injudicious and hazardous. The laws of physiology do not condemn the custom, of allowing ewes in lamb to live entirely on turnips, more than the practical experience of flockmasters themselves. Sad losses, indeed, have accrued from perseverance in the system, and yet some farmers are so hard to turn out of old ruts that, in various parts of the kingdom, it still holds sway; while in others, and particularly the South-Western Counties, immense quantities of hay are given to ewes before lambing. As Mr. Coleman intimates, it would he well if such sheep, when they must have turnips, were always allowed free access to good wholesome straw; their shepherds would be astounded at the large quantities they would devour of their own free will. This is already done in Scotland to a great extent, and on all large English sheep-farms it appears to be a growing custom to economise the consumption of hay by flocks in the depth of winter by giving fattening hoggets a mixture of hay- and straw-chaff, and allowing ewes access to loose straw placed in cribs or racks.

The increase in the employment of straw as fodder for sheep has, however, been small, compared to the change which has brought this product more extensively into use in the feeding of cattle. The revolution in the meat-market which has marked the past quarter of a century had the effect of bringing oilcakes and other rich auxiliary feeding-stuffs into more general employment, particularly in winter. Shrewd grazing-farmers were not slow in making the discovery that the most economical method of producing beef is to limit the supply of roots to at least half the quantity the animals would devour in the absence of other food, and make up the remainder with dry substances of two entirely opposite descriptions: the first, highly nutritious, consisting of oilcake, meal, or some other rich oleaginous, farinaceous, or saccharine compound, given in quantities conformable to the animal's powers of assimilation; the second, a bulky, sweet, wholesome food to satisfy the demands of the bovine system for bulk of provender. The stomach of the ox is large, and must be satisfied by some means. Either hay or good straw fodder will do equally well so far as the tastes and organic requirements of the bullock are concerned; but to ensure perfect economy in feeding, the former had needs be either sparsely used or abandoned altogether, and straw or chaff be made the filling-up substance.

The same principle holds good in an equal degree in the winter feeding of young cattle and dairy cows. Hay, which has been so generally employed in the past in feeding the latter after they have calved and the former throughout the season, is a far more costly commodity for either kind of stock than a mixed diet of cotton-cake, roots, and straw. If this were better understood, less hay would no doubt be made; and grass crops, at present appropriated to the manufacture of hay, would be more generally utilised as food for stock in summer, which would allow the proportion of stock to the acreage to be considerably increased. In fact, the question of the utilisation of straw as food affords economical suggestions at every step in the inquiry. The interesting statement of Mr. Coleman in regard to the management of cattle on Lord Wenlock's farm, at Escrick, shows to what an extent the number of animals might be increased by a greater proportion of the straw being consumed as food; and other statements have been furnished to me, all tending to prove how largely this might be made to serve the interests of farm economy.

Mr. George Adams, of Pidwell Farm, Faringdon, not only supports the views enunciated above, as to the extravagance of hay-making and hay-consumption, but states decidedly that by giving it up and feeding on straw and artificial foods as substitutes for hay, he has been enabled to double his stock of cattle and sheep. Mr. Adams says:—

"In answer to yours, I keep 100 dairy-cows and 220 breeding Oxfordshire ewes, with the produce of the latter; the ewe-lambs being kept for stock and the ram-lambs fed for sale. I could not possibly winter so much stock if it were not for the cutting of 50 acres of my best straw into chaff for the young and store animals, particularly as my land lies low, and treads very much. I reckon on yarding 250 beasts from Christmas up to 1st of May, and all the young and store stock live on wheat- oat- and barley-straw cut into chaff by steam. I grow from 30 to 35 acres of golden tankard mangolds each year, and pulp on an average 5 cart-loads each morning to mix with the straw-chaff; and I have 100 gallons of good linseed-gruel thrown boiling hot over and mixed with the straw-chaff and pulp-mangold every morning ready for the night and next morning, and on Saturday I have a double quantity done to last till Monday. I find my young stock do far better than they did when living on hay at double the cost. The dairy-cows are fed the same till near calving. The boiling of the linseed and putting it into the chaff boiling hot causes the chaff to ferment, and the cattle eat it eagerly and do well. My ewes live on the same food, with two to three bushels of malt-dust mixed with it each morning, when they can be got near the feeding-shed. All my barren cows are fatted out on the same food, with 4 or 5 lbs. of cotton- and linseed-cake per day each; and I find that my dairy-cows do not thrive so well after going to hay, with 4 lbs. of cake per day each after calving, as they did before, at one-half the cost, upon the straw mixture. I assure you, if it were not for cutting up all my oat- and barley-straw, and about 50 acres —which is one-half—of my wheat-straw, I could not keep more than half my present stock of cattle and sheep."

Mr. George Street, the well-known sheep-breeder of Maulden, Beds, says:—

"I am of opinion that straw might be economised, and that considerably more stock might be kept. It is the practice of many to spread barley-straw about the yards to be browsed over. This plan I think objectionable, as unless the yards are kept too thickly littered, a considerable portion is at once trodden into dung by the cattle and pigs. I prefer having plenty of cribs, filling them with straw twice a day, and, after it has been picked over, spreading the refuse for litter. The cattle are then supplied two or three times a day with chopped straw, and a portion of hay-chaff, cake, and meal; and if a few roots are added the animals will do very well without hay. I do not, however, advocate giving many roots, as it involves considerable expense in cartage, and, as a rule, sheep pay better than cattle. The barley-cavings and bean-straw are given to horses; pea-straw to the flock of ewes, as it is likely to produce colic and inflammation if given to horses. I always give the horses a little hay when they come home from work before feeding them with chaff and corn, as they are in danger of eating ravenously, the chaff forming a stoppage and producing colic or "gripes." I am not sure that it is desirable that yards should be entirely covered, but it is necessary to have plenty of shelter-hovels, as not only do the cattle get on better, but much less litter is required. I think it would answer in many cases to sell hay, and buy cake, maize, locust-beans, barley, &c., to be ground and mixed with chopped straw. There may not be much goodness in straw, but animals require *filling*. They will not feed on cake and meal alone, any more than we could thrive on meat without bread and vegetables. I believe in a mixture of food, but both quantity and quality are needed."

Arthur Young remarks in his 'Calendar,' which was issued at the commencement of the present century, that the best farmers of Norfolk were then agreed that cattle should eat no straw unless cut into chaff and mixed with hay; but, on the contrary, that they should be fed with something better and have the straw thrown under them to be trodden into dung. This was enlightened opinion for those times, when comparatively few roots were grown, and it was not customary to use much oilcake in feeding. That Norfolk farmers have advanced with the times is fully shown by the following statement which Mr. C. S. Read, M.P., has been good enough to furnish me with:—

"I am not aware that any farmer in East Norfolk has tried the plan recommended by the late Mr. Jonas in the 'Royal Agricultural Society's Journal.' Barns are not so large or so numerous in this part of Norfolk as they are in some districts, and they are mostly all filled with corn at harvest. Mr. Jonas's plan, if I remember rightly, was to fill the barns with chaff in the summer, and consume it the following winter. Whether the farmers in Norfolk are afraid of cutting up green fodder with the straw, or they do not care to have their barns occupied for so long a period, the experiment has been rarely, if ever, tried in this district. But the custom of cutting straw into chaff has extensively prevailed for some years. Cattle are now mostly fed on roots cut with Gardner's turnip-cutters, and it is a common practice to mix with the roots a quantity of corn and straw-chaff. The chaff is more extensively used when the cattle are first placed in the yards, and is gradually modified in quantity as the cattle increase in weight, or sometimes a quantity of hay is mixed with straw, and so the chaff is made more palatable and nutritious. The usual plan is to hire one of Maynard's, or some other good chaff-cutter, which is frequently kept by those who let out steam threshing-machines. The chaff is trodden into a barn, and is sometimes mixed with salt or malt-dust, but more generally nothing is added.

"No doubt the straw-chaff softens and mellows when a large quantity of it is kept some time before it is used. A slight fermentation usually takes place, and this is certainly increased by a judicious admixture of salt. But the chaff is often used directly it is cut, and mixed with roots for a short time before being given to the cattle. A fermentation is thus set up, and the mixture is given warm to the cattle.

"In those parts of Norfolk where most of the roots are consumed in the yards, and only a small portion on the land, this system of using straw-chaff is rarely adopted. It is more common where the major part of the roots is consumed in the field, and only a small portion is removed to the homestead for grazing cattle. The more extended growth of mangold wurtzel also increases the consumption of straw-chaff, as the mangold can be thus used at all seasons of the year, whereas it was formerly thought dangerous, or at least disadvantageous, to consume that root alone during the winter months.

"No doubt many more cattle, especially store bullocks, can be kept where straw-chaff is used, but its greatest value is where straw is plentiful, and roots are scarce. In a season like this, straw is so short a crop that cattle in open yards can scarcely be kept decently littered; therefore as roots are plentiful, not so much straw is cut into chaff as in previous seasons. But where there are plenty of loose boxes or covered yards, straw can be easily economised, and turned to a more valuable purpose than bedding for stock.

"On large flock-farms it is a common practice to feed the ewes with a considerable quantity of straw-chaff. This has a most beneficial effect upon the sheep, counteracting the too watery properties of the turnips. A little straw-chaff is also given to the younger sheep, but then it has generally a good admixture of hay with it.

"The chief arguments against the extended use of straw-chaff are the diminution of the bulk of farmyard-manure, and the necessity of plenty of straw to keep the cattle warm and comfortable. Should the area of corn grown be diminished, there will be a still greater demand for covered buildings, if the same amount of stock is kept during the winter. Straw-chaff, no doubt, greatly economises roots, but it will be the greatest difficulty to keep cattle clean and comfortable in open yards if so much straw is consumed.

"I have not heard of any substitute for straw being used for bedding cattle, save, perhaps, a little sawdust near some timber-yards. Sparred floors are, I believe, unknown in Norfolk. In the north-east of the county a great quantity of sedge and rushes, grown on the banks of the tidal rivers and by the margin of the broads, is used as rough fodder. The cattle eat some of the sweeter portions, but the bulk is trodden down as litter, and makes most excellent manure. Few oats are grown in Norfolk, but, when they are, the straw is always preferred for chaff. Some farmers like wheat-straw next to oats, contending that it is more nutritious, and makes better chaff than barley-straw, but the latter is more generally used, as the chaff is softer, and more relished by the stock.

"Very little straw is sold in Norfolk, perhaps less than in any county in England of the same size. The demand this year is greater than usual, but prices are not so exorbitant as in some other parts of the kingdom. But there is really a straw famine in Norfolk this winter, and by the time next harvest is here there will be precious little straw left, certainly not sufficient to thatch the corn-stacks.

"Summer-feeding seeds in Norfolk does not produce the good which results from it in some other parts of England. Most artificial grasses, but especially clovers, frequently produce better wheat after a crop of hay than when the seeds were fed off during the preceding summer, even with the addition of corn or cake.

"It may be worthy of remark, that one of the leading tenants upon the Holkham Estate (certainly one of the best known and most successful farmers of his day), during the last few years he was in business ceased cutting roots for his cattle, and whether they were turnips, swedes, or mangolds, used them all *whole*. This, I believe, is the Scotch plan; certainly it is the practice of Mr. McCombie; but then it can only be successful when the roots are given to oxen of a good age and size, and the roots are supplemented with other food. But it is somewhat curious that the old fashion which prevailed in Norfolk in the days of our grandfathers—of feeding bullocks upon *whole roots*—should be revived again, after the processes of slicing, shredding, and pulping, have prevailed for so many years."

Mr. William Linton, of Sheriff Hutton, York, has kindly supplied the appended information on the consumption of straw as fodder in his district. He says:—

"Nothing can be more varied than the quantity of straw grown upon the several farms in this part of Yorkshire; and its use as food is equally as varied, according to the proportion of it to that of the stock kept. Upon some farms, where the proportion of ploughing land to that of grass is large, the number of cattle kept is proportionately small, and the use of straw is of but little account. Upon this class of farms, which are mostly of turnip and sheep land, the manure is worth but little; and where the distance of cartage is rather considerable, the purchase of artificial manure is more desirable for the turnip crop than the foldyard-manure is at the cost of carting, taking into account the loss of time in a busy season, &c. But in cases where the farm comprises a large proportion of grass, and many cattle are kept, the manure arising from the limited quantity of straw is as good and as valuable as manure in any form for any purpose.

"Unthreshed oats are used extensively, chopped or chaffed for horses, and sometimes for sheep, upon turnips in winter. The quality is much improved if the oats are reaped before they are fully ripe. If cut in this state, and secured favourably, the horses will mostly work well, with little or no additional food. Without chopping, straw is not used for horses or sheep, and is not steamed, fermented, or cooked; but it is mostly given to cattle as it comes from the machine, in the foldyard. It would be much improved, and would keep double the number of cattle, if the foldyards were covered, the straw chopped, and a small quantity of pulped roots added to it. If this were done, a far larger number of store cattle and young horses might be sustained through the winter than upon a very limited quantity of uncut straw. In proportion to the economising of straw, and appropriation of it as food for cattle, the breadth of hay can be reduced; it consequently becomes an important question as to the best method of so adapting straw for food in the most palatable form and for general use; and I know of no other way, than as already stated, to meet our wants. Large and expensive steam apparatus is not so adapted, neither have I yet met with a 'steamed-chaff' system which gave satisfaction. Of course this matter directly affects the winter season, but it has an important bearing upon every season of the year, especially now, when the strong, heavy ploughing land is, or ought to be, sown down with permanent grass—a question which is calling forth the serious attention of all who have such land under the plough."

Mr. John Roynon, the Steward of Mr. D. McIntosh, of Havering Park, Essex, not only gives a description of the state of things in the Romford district, but enters very fully into the straw question, one of the happiest solutions of which is to be met with in the spacious covered yards and conveniences of all kinds for grinding, chaffing, pulping, and preparing mixed foods to be found included in Mr. McIntosh's improved homesteads. He says:—

"A comparatively small quantity of straw is used, as a rule, either for food or litter in our district. It being near London, the straw is mostly sold for the Metropolitan market; and in this locality live stock are not largely kept for feeding purposes, especially for stall-feeding. But we use straw largely; in fact, I could have sold the straw we used for food and litter on the Havering Park farms last autumn and winter for 30*l.* per week. We give it as food to cattle, horses, and sheep. To cattle we give four-fifths straw to one-fifth hay; to horses about one-half straw to one-half hay; and to sheep about one-half or three-fourths straw to one-half or one-fourth hay. We use straw invariably cut into chaff, and the latter entirely uncooked. Cutting it into chaff is decidedly the most economical way of using straw for either kind of stock; but where steaming is adopted, if there is any practical good in it, it might be preferable to steam for young animals, to assist digestion;

but I think in most cases where steaming has been tried, it is now abandoned, which speaks for itself. Hay may be dispensed with for fattening-beasts. We have used straw cut into chaff for feeding bullocks for years past, and find they do very well on it, with pulped roots, linseed-cake, and meal. We have fed off about 100 bullocks a year for the past seven years; and we keep our Shorthorns principally on cut straw and pulped roots, &c., all the winter months. I do not believe in littering cattle in boxes with cut straw (unless the manure is especially required for drilling purposes, as some use it), as I consider the use of whole straw is more economical, and keeps cattle much cleaner. I believe in sparred floors, especially for young cattle; they not only keep them more healthy and strong in their legs, but very much economise the straw as well. I do not know what could be used as a substitute for straw as litter in this district. As I before said, live stock are not much kept in this district for stall-feeding, nor yet sheep; but supposing that the whole of the straw which is grown were used as food for live stock, double the number of sheep and cattle might be kept. It certainly would be desirable to make less hay, and summer-feed the grass with the cattle or sheep intended to eat the straw in winter; or otherwise feed them off with cake on the grass, as might be deemed advisable. We have never tried Mr. Jonas's system for improving the feeding qualities of straw, but we mix the straw-chaff with mangold-pulp, and allow it to remain some twelve hours before using it; the chaff thereby becomes softened and more palatable, and we find the cattle eat it with great relish. The mixture is very good for about twenty-four hours after mixing, but if allowed to remain much longer, it becomes sour."

Mr. Alexander Jemmett, of Binfield, Berks, attributes wholly to the want of covered yards and other conveniences the fact that straw is not more generally utilised as food; and the extent to which it is employed as such, in cases where there is perfect accommodation, such as at Havering Park, Tiptree, and Escrick, goes far to support this view. Mr. Jemmett says :—

"Under existing circumstances, the greater portion of straw grown on the farms is wasted in soaking up pools of water in yards with the minimum amount of spoutless shedding, and receiving the water from barns and adjacent buildings. This is a serious evil, requiring the attention of owners, as tenants are compelled to consume hay, straw, and roots, on the premises. Straw is not used for food to the extent it would be with better arrangement of buildings. Covered yards and properly constructed pavements would effect a great saving in straw used for litter, and stock might be increased about 30 per cent. were more straw used as food. I employ straw chaffed, mixed with hay, &c. Steaming and other methods of enhancing its feeding value would, no doubt, be followed out, were better accommodation afforded.

Mr. R. Vallentine, of Leighton Buzzard, Beds, also animadverts on the same subject. Alluding to his district, he says :—

"On arable farms, most of the straw produced is consumed as litter in large open yards, which in wet periods allow a large quantity of liquid manure to run from them, generally as waste, neither tanks nor any other provision being made to utilise the drainage. I know that a very large number of farm premises are so situated that the liquid manure might be easily allowed to flow upon grass-land adjoining, and be so distributed by open gutters, that some acres might be easily manured with what is usually wasted. Covered yards, or more house-room, is very much required on most farms, for the better accommodation of cattle. There would thus be a saving of food, of litter, and of manure; and a faster increase of the animals in condition by being kept both warm and dry. Every practical farmer knows this well; still the individual and great national loss endures from generation to generation."

Mr. E. J. Bullen, Norwood Farm, Southwell, Notts, after alluding to the extensive employment of straw for food in his district, gives testimony, founded on experience, of the value of sparred floors, and the reader probably observed that Mr. Roynon said he approved of them. Mr. Bullen's statement is to the following effect:—

"At a rough guess I should say that from one-fourth to one-third of the straw is eaten, the rest used for litter. I give it to horses and cattle, supplemented by corn, turnips, and cake, according to the class of stock, as much as they will eat. I cut it into chaff for the horses and mix it with corn, &c., in the manger; for cattle I also cut it into chaff and mix with pulped roots, but do not let it ferment. Generally, cattle do better on straw cut into long chaff; horses require it short. Last winter I used most of my straw as food for cattle; as I had very little hay, the straw was cut into chaff 2 or 3 inches long, and was mixed with pulped mangold wurtzel with more or less cake or other feeding stuffs. I can strongly recommend sparred floors; I have tried them on a small scale and find that they answer uncommonly well. If sparred floors were used instead of straw-litter, and the straw thus saved used for fodder, cattle might be doubled in number. I should say in such a case it would be desirable to make less hay, but this would depend on the circumstances whether the hay was wanted to cut up with the straw, or whether roots or some other green crop were used. Mr. Jonas's system has not been adopted here. Pulping supplies that want, and very few farmers have either the old straw to cut up, or storage room for a lot of chaff."

Mr. G. Neale, of Newfield, Notts, says:—

"As your queries are of great importance, I have great pleasure in answering them. I believe two-thirds of the straw in this district are used as litter. We give straw to fodder the cattle in open yards, and in this way an extravagant waste takes place. The only part we utilise properly is the chaff, which we separate at the time of threshing, and mix it with chaffed fodder for horses; we also give it to the milking-beasts, mixed with meal in a dry state. When using chaff or cut straw for horses, I consider it desirable to moisten the food with cake-water, or linseed soaked in water, and also to use a little bran. Cattle living partly on roots will not experience any ill effect from the dry food. Many farmers, where roots are plentiful, use nothing but straw and roots for wintering store-stock. In other circumstances, half a cake per beast per day is sometimes given with straw. As to the economy of litter, I am afraid we can find nothing to act as a perfect substitute for straw. What, then, can be done to make straw go further, and encourage farmers to make more use of it as a food instead of carting so much from the yard to the fields in a state of sodden litter? My idea of the situation, and the most practical method I can see of utilising and economising straw, is to have covered-in yards, which I feel convinced, if generally adopted, would enable us to consume two-thirds of the straw as food; the remainder would take the place of the larger proportion under the old system of open yards, and serve under the covered yards as litter. I have no experience about littering boxes with cut straw, but imagine that, owing to the expense of preparation, there is no economy to be gained.

"My experience of the use of straw as a food, and where I attach to it the greatest value, is in special and emergent cases. In 1868 I began farming near Mansfield, upon a sheep-farm. My turnip-crop that year was almost a total failure as regards the main crop; we did raise a crop of late common turnips, but could not spare any for the cattle in the yards. Nearly the whole of the barley I grew was fit only for feed-purposes. I had taken (fixed in the buildings) a steam-power 6-horse threshing-machine, including grinding fixture and chaff-cutter; under these combined circumstances I thought it best to consume the inferior barley on the place instead of buying other food. The barley we ground, and the straw we cut into chaff as we wanted it, but did not give it to the cattle in a dry state. I had a copper fixed, and a large stone trough placed by the side of it. My plan was to boil linseed, 1 lb. per head per day, for two-year-old heifers. When it was mixed, a layer of chaff was first placed in the trough, and scalding liquid thrown over it, then turned over. On this was placed a quantity of meal, and so on. I gave 3 lbs. of barley-meal per head. I can only say the plan answered all my expectations, and my cattle never did so well as when treated in this way."

Mr. G. T. Wright, Stokes Farm, Wokingham, does approve of Mr. Jonas's method of improving straw fodder, as the result of practical experience. He says:—

"I have tried it several times, and find it very useful. It seems to me, the great secret in preparing it is to have it thoroughly well trodden down into its store place, then it comes out with a smell like new hay, and is much relished by stock. I am not aware of its having been tried on other farms near here. During the last few years much more care has been taken to utilise all the produce of the farm. Some seventeen or eighteen years ago, when on a farm near Bristol, I saw great heaps of chaff and cavings as it came from the threshing-machine, left to rot or carted on to the grass grounds, whilst the cart-horses were often short of food. Now, this is all carefully stored and is very useful food in winter.

"I grew this season thirty-four acres of wheat, twenty-three acres of oats, and sixteen of barley. I expect to use the whole of the oat- and barley-straw, and quite one-third of the wheat for fodder. I think not very many in this district use so large a proportion. But its feeding value is becoming more known. I have used it for horses and cattle, but not for sheep. My cattle get their chaff mixed with pulped roots, grains, or meal. Horses have it damped and mixed with crushed oats and maize."

Mr. F. M. Jonas, of Crishall Grange, Saffron Walden, has favoured me with a communication of great value on more than one point connected with this inquiry. Not only does he describe some improvements in the system of cutting and storing straw-chaff associated with his father's name, but he gives facts from his own practical experience, proving that straw-chaff may be economically employed in other ways, so as to increase the number of animals per acre. I append, however, his own interesting remarks. He says:—

"On many light-land farms, where the tenant is not allowed to sell any straw, one-sixth part of the straw is used for food, the rest for litter; but on my farm one-fourth part of the straw grown is used as chaff for food for cattle and sheep, about equal quantities for each. The horses have only wheat- and barley-chaff as made by the machine.

"I never use straw for sheep in any other way than taking chaff from the chaff-barn, putting the chaff in the troughs and scattering the cake and corn on it; if it is for stock ewes which have no corn, I give them the chaff just as it comes from the barn; but sometimes, when the chaff is not so good as usual, I mix a little malt-dust with it. For cattle I used it one or two years fermented by boiling the cake and meal, and then pouring it while hot on to a bed of chaff; this answered very well, but the butchers complained of the quality of the beef when so fed.

"I am now using treacle for cattle, allowing about one pint per head, which is put in a tub of cold water stirred up well with a broom, then poured on the bed of chaff and corn from a water-pot with a rose on; this answered very well last year, and I am trying the same again this year. I do not use any roots, so the treacle is to moisten the chaff instead. I consider, at the present price of labour and the great price of butcher's meat, many farmers would do well to leave the roots on the land and fold them off with sheep, *where the land is not too strong*, rather than go to the great expense of cleaning and carting them off for cattle which can be fattened by other means.

"By using a large quantity of chaff for sheep, and folding all my roots on the land, I can now keep one-and-a-half sheep per acre; but a few years ago, when the sheep had hardly any chaff, and roots were carted off for bullocks, one sheep per acre was enough. Economy in litter might be ensured by covered-in yards, and more still by stacking the straw more carefully. Many careless people allow it to get half-rotten before it gets into the yards. Consuming more straw renders it desirable to make less hay and to summer-feed some of the meadow land.

"The system, as described by my father in the 'Journal,' has very much increased, and those who have tried it are very pleased with the results. On this farm, which consists of 850 acres of arable land, I cut into chaff every year 100 or more acres of mown wheat or oat straw, just as described in the 'Journal'; but I use pulped mangold instead of tares, rye, &c., as I can depend better upon the quantity of moisture contained in it; and an improved method costs me less than half what the work used to cost on the same farm as described by my father. In the first place, the three men for moving the straw from the barnworks to the chaff-box are done away with by putting the chaff-box close up to the barnworks, only having a small boy with a forked stick to push the straw to the man feeding the chaff-box. Secondly, I had Mr. Maynard to make a long elevator for the chaff-box, so that it puts the chaff into the barn instead of three men carrying it there in bags. By this means I cut straw into chaff and deliver it into the barn with less hands than are usually employed to stack the straw.

"The reason I have written such a long account is to show what a great value I put on straw cut into chaff as a means of enabling farmers to keep more stock, which at the present price of corn is the only means of profit left to him.

"Secondly, to explain what a very little trouble and expense is now required to get such a valuable article of food."

From the above it appears that mangold-pulp has been deemed preferable to green stuff for mixing with the straw-chaff to cause the necessary fermentation; and if the food thus prepared comes out when required for use having the same quality and flavour as are obtained by the admixture of small quantities of green clover, vetches, or rye, no doubt the change will be considered an improvement calculated to extend the adoption of the system. The method originally described by the late Mr. S. Jonas almost necessitated the storage taking place in the summer months between May and September, because at other times green crops would be scanty: but if mangold-pulp will do as well as green chaff, the storage may take place at any time during the heavy threshing season from September to March. But the system evidently admits of variations in details, and Mr. John Ford, of Rushton, Dorset, a large farmer of much practical experience, in writing to me on the subject of this paper, maintains that the leading advantages of fermenting the straw, and impregnating it with a grateful aroma, may be obtained without cutting it into chaff at all. Although he has never carried out Mr. Jonas's method, yet long before he heard of it he had been in the habit of mixing small quantities of green clover with straw when stacking it fresh from the thresher in the month of May. This always made an important improvement in the quality and flavour of the straw by the time it was required to be cut into chaff in the following winter; and his cattle devoured it with great avidity. A suggestion was made by myself in an agricultural newspaper, not long after the details of the admirable system of Mr. Jonas were first made public, that probably small farmers might find it more convenient to stack loose straw with green clover or trifolium, and that it appeared reasonable to suppose that kindred results would follow. That was, however, mere theory, whereas Mr. Ford renders practical proofs. Nor is this the only point on which he gives good testimony as to how straw can be rendered most valuable as food for stock. He is regarded throughout the south-western part of the kingdom as a leader of popular opinion on the question, and it appears from his communication to me that in his opinion all stock should be supplied in winter with as much straw as they will eat, in conjunction with either cake, corn, or roots, and that he makes straw a substitute for hay to an extent which enables him to summer-feed the greater part of his clovers. For considerably over twenty years he has been in the habit of cutting his oat-crops before they acquire a decidedly yellow hue, purposely to improve the feeding value of his straw; but on this topic, and some others, I must quote him entire. He says:—

"With regard to my oat-straw, the feeding-bullocks get the greater part of it, and I always endeavour to cut oats before they are quite ripe, to have the straw better. If sheaved and put up in clumps, ten or twelve sheaves together, they will remain until fit for harvesting safe from much damage by weather, and the straw is of much better quality than it would be if allowed to get ripe before cutting. I believe in this plan of reaping oats prematurely; no loss is sustained should there be a little in the grain; this is more than made up in the straw. I find my fattening-cattle very fond of oat-straw

> obtained in this way, and by giving it to them in small quantities they eat it with as good an appetite as they would the best of hay. I feed my store beasts through the winter months with oat-straw and a small quantity of roots, and about 2 lbs. per head per day of either linseed-, cotton-, or rape-cake. Occasionally, however, I employ corn instead of the latter, using the kind of artificial food I deem cheapest for the time being. After many years' experience I can confidently pronounce this method of feeding a great improvement on the old-fashioned way of feeding on straw alone, as it adds very much to the manure, as well as to the growth and constitution of the animal. For fattening-cattle I also find by experience it will answer an arable-land farmer better to feed with straw than hay. Mine get oat-straw, roots, cake, and corn, as their winter diet, and they obtain as much nourishment as their stomachs can take up at less cost than would be incurred in giving them hay. Were it not for sheep, I should never think of making hay on an arable farm. I feed my breeding ewes twice a day with barley-straw, until commencing lambing, when I give them hay. When the straw has been well harvested, and the sheep are in good condition, a great quantity will be devoured by them, and I prefer giving straw, and a larger supply of roots, than to depend so much on hay; for if the latter is not sweet and good, I consider it to be the worst food a breeding ewe can be fed on."

By cutting his oat-crops before they are fully ripe, Mr. Ford only carries out practically the teachings of science. Dr. Voelcker has repeatedly pointed out in this 'Journal' how vastly the feeding value of straw may be heightened by the crop being cut before the juices of the stalks have all been converted into woody fibre by thorough ripening; and whenever straw is made more generally an article of food farmers will be under the necessity of paying more attention to the early cutting of grain-crops. There is even a material difference between the composition of wheat-straw tolerably well ripened, and of the straw of wheat which has over-ripened.

In Dr. Voelcker's exhaustive paper on the 'Composition and nutritive value of Straw,' in vol. xxii., first series, of this 'Journal,' the following analytical results are given of two samples of wheat-straw, the one fairly ripe, and the other over-ripe:—

	Ripe	Over-ripe.
Water	8·14	9·17
Oil	1·10	·65
Soluble proteine compounds	·50	·06
Insoluble proteine compounds	1·62	2·06
Gum, sugar, and extractive matters	6·28	3·46
Crude woody fibre	79·31	82·26
Soluble mineral matters	1·99	1·29
Insoluble mineral matters	1·06	1·05
	100·00	100·00

To these may be added the subjoined valuable analyses of straw-chaff after being improved by the Crishall Grange process, ANALYSES OF FRESH AND STORED CHAFF.

	Fresh Cut.	Stored Chaff.
Moisture	16·12	12·01
Albuminous compounds	4·61	4·17
Mucilage, sugar, and digestible fibre ..	38·29	45·19
Woody fibre	33·27	31·10
Mineral matter	7·71	7·53
	100·00	100·00
THE SAME TRIED IN BOILING WATER.		
Moisture	16·12	12·01
Matters soluble in water	12·84	22·89
,, insoluble in water	71·04	65·10
	100·00	100·00

conducted by Dr. Voelcker, and for which I am indebted to Mr. F. M. Jonas, who says:—

> "One sample was taken just as it was first cut, the other after it had been fermented and stored for three or four months. The chaff was fermented with green rye, cut up at the same time."

The period of cutting is, however, not the only circumstance which tends to determine the value of straw as food. The nature of the soil on which it is produced does this in a very material degree, and will often account for straw being employed more as fodder in one district than in another. Peat and alluvial soils naturally grow the stalks of plants very stout and coarse, and if the grain-crops are allowed to get only tolerably ripe before cut, very little of it would be fit for stock-feeding without maceration or steaming. Mr. George Angus on this point says:—

> "Your inquiries relative to the utilisation of straw for cattle-food would, I think, meet with only one reply from the farmers of Holderness. The straw grown in this district is, for the most part, so very coarse and dry, that it would never pay to try by chopping or steaming to transform it into any kind of compound likely to contain any feeding virtue. Upon the Yorkshire wolds, and where the harvest has been favourable, the straw is finer, and contains more nutriment certainly; but considering the price of fuel, oil, machinery, and, most of all, manual labour, I do not at all believe that any margin of profit would remain, even when the best known processes of converting had been judiciously and carefully carried out.
>
> "I think if the finest part of wheat-, barley-, and oat-straw grown upon a farm, say to the extent of one-third, were chopped by one of Richmond and Chandler's Chaff-cutters, and then mixed at proper intervals (to avoid undue heating) with pulped turnips, a useful mixture, but not a fattening one, would be obtained.

"My plan is to save every particle of chaff on threshing days, store it up in the barn, and twice or thrice a week use about one part in bulk of pulped turnips to two of chaff, and so form a good-sized heap, which heats in a few hours. We give this daily to the cattle in tumbrils, and generally add to the top of each basketful, when given, a few handfuls of crushed linseed- and cotton-cake. This is, so far as my knowledge and experience go, the readiest, and at the same time the most economical, way of using up the pulse and refuse of our white crops."

Markets, no less than the nature of the soil, affect the solution of the question very much in the minds of farmers. In the neighbourhood of all large towns, straw commands high rates as well as hay, with always a good demand, and it is considered a great advantage to be able to sell both. Professor Buckman, who farms in a populous, as well as highly fertile, district on the borders of Somerset and Dorset, would much prefer to sell straw than adopt any extraordinary tactics for its enlarged consumption as food. He says:—

"In this district some of the best straw is used for chaff: more is employed in the straw-barton (foldyard); but straw is more used here for litter than for food. We give best straw in the shape of chaff for all kinds of stock. In the strawyard cows get no hay, but the straw is supplemented by from 2 to 4 lbs. of cake per diem.

"We supplement our hay-feed with chaff in the stables, but in the straw-yard it has no preparation.

"Straw is very much used for gravid (in-calf) cows, and frequently in both Dorset and Somerset without even hay or cake. At the present prices of hay and straw, we think it would be much more profitable to sell it than to feed it, as there is always a market for it, and no trouble of cartage. Artificial manures occupy but a small compass, and in our experience we find them much more economical in their use and application, besides being so much more certain in their operation than farmyard-dung."

Mr. Thomas E. Dowden, of Bere Regis, Dorset, although residing only some 20 miles from Professor Buckman, farms a poorer soil, and, being differently circumstanced, is in the habit of consuming a considerable proportion of his straw as food. He considers that if his system were more generally adopted stocks of sheep and cattle might be increased from 25 to 30 per cent. in the district. He says:—

"I have for the last thirty years cut a large quantity of my straw into chaff, and thrown over it a sort of gruel, composed of boiled linseed, ground Indian corn, or any other meal I can buy cheap. I have found horses, cattle, and sheep do well on it; it is not generally practised in this neighbourhood. I think it very desirable to make less hay, and to summer-feed, as haymaking is a very expensive process."

Mr. Heber Humfrey, of Kingstone Farm, Shrivenham, Berks, the well-known breeder of Berkshire pigs, expresses opinions on this question which place the advantages to be derived from the removal of restrictions on the sale of straw far above those which he thinks would follow from its largely extended employment as food for stock. He says :—

"Feeding with wheat-straw is quite the exception in this neighbourhood, though I think my experience would be that store-cattle with the same amount of cake and wheat-straw, would thrive faster after the first few days, than with barley- or oat-straw.

"Where there are no restrictions as to selling straw, the price of 60s. per ton at the nearest railway station would naturally limit the use of it.

"Where there are restrictions, the present price would rather point to the use of a larger proportion in this or some other practical manner, in preference to casting it wholesale into the stock-yard, where it would come out another day as low-pressure farmyard-manure, or to placing it on farm-buildings as a covering which is neither vermin-proof nor fire-proof.

"I have some lands, in the more exposed situations, which would very much miss the return of straw in some shape as manure: I believe the continued absence of such manure would bring about a state of things beyond the reach of our present substitutes, even if generously applied. But supposing this to be the case, it seems a great pity that such a consideration should stand in the way of more advanced farming where the land is richer in character or more favourably situated.

"The feeding of barley- and oat-straw by sheep and cattle is quite a general practice. I should say, perhaps, of the bulk grown, one-fourth may not be placed before them—from being threshed out of season or some other cause; of the remainder, half would be fed by cattle and half by sheep, two-thirds of which would be actually consumed; the refuse, being rejected as unpalatable and indigestible, would be levelled about the yards for bedding. Wheat-straw fed by cattle would carry about the same waste.

"If we take a bundle of straw, and place it with others on a building, we expect it to stand all weathers for from twenty to thirty years; then, if we give the next bundle to a pair of cows, we expect them to extract all the nourishment and all the consistency in about as many hours: surely we ought not to refuse them a little right of selection—and we could not expect them to thank us for any mechanical or chemical interference which would make it more difficult, still less would they be grateful if we made the selection impossible.

"I do not consider it pays in any way for chaff-cutting, except for convenience of mixing with hay or other food to simplify the work of feeding at off-lying stations.

"With cattle (and I dare say it is the same with sheep in a less serious degree), I find that the process of rumination is made difficult in proportion to the trouble taken in improving the straw from its natural state.

"There are some articles of food which I should like to see placed in the hands of our scientific advisers, to be changed from their natural state and rendered palatable and profitable; they are often to be bought at a reasonable first cost, in proportion to their bulk. I mean the lower-priced cotton-cakes, locust-beans, millet, rice-meal, &c., articles evidently intended to fill and not to fatten; they would come into the same class of food as the straw, with which, from your questions, you would have us feed more generally.

If we were to increase our stock throughout the year so as to feed nearly all our grass-crops in a green state, and then consume our entire crop of straw in the winter, how should we prepared for a year like 1860, when there was no straw harvested on account of the rain? or years like 1868 or 1870, when there was comparatively none to harvest? Can you imagine what cheerful stock markets we should have for a time when such seasons dawned upon us? Pray don't advise tenant-farmers to get into such a corner. Rather try and improve our selection of low-priced artificial feeding-stuffs, and clear away for us any restrictions that may fetter our selling and buying, as the merits of each case may dictate to us."

The Aylesbury Vale furnishes the following as the experience of one of its farm occupiers :—

"Straw is generally used as litter, this being more of a grazing and dairying district than a farming one; but I myself, having 160 or 170 acres of arable land, out of a 500-acre farm, generally cut up a good deal of straw. I use straw for horses in chaff consisting of about three-fourths straw, one-fourth hay, no long hay or straw being given. For beasts I vary according to circumstances. In a good year of hay, perhaps I give one-fourth straw to dairy-cows, and nearly one-half straw to dry stock. I do not use straw-chaff for sheep. In a short season of hay I give probably one-half straw to dairy-cows, and three-fourths straw to dry beasts, always mixed with pulped mangold or swedes, generally mangold; cake is used and varied according to circumstances. I always use the food fresh mixed. In a plentiful hay season I do not always use it as chaff, but give the dairy beasts the hay whole, and the young beasts whole straw and roots, or 3 or 4 lbs. of cake, which I prefer with the whole straw. No doubt more cattle can be kept by using chaff and pulped roots, as I myself, I should think, keep twenty or thirty more beasts through the year since I have adopted the system I now yearly pursue—mowing less and grazing more—but the increased price of labour makes it a question with me whether it now pays; but this year I shall be compelled, through the shortness of hay, to cut up everything I can."

Nothing can possibly show the variability of custom and opinion on the straw question than the fact that, whereas the last statement gave as a reason for straw being chiefly used for litter in the Vale of Aylesbury, the circumstance of its being a dairy and grazing district, the following, posted to me from Shaftesbury, points to dairy-farms as the very places where straw ought to be used as food. The writer says :—

"On well-managed dairy-farms as little straw as possible is used for litter, all the wheat- and oat-straw, except what is used for thatching, being fed, and even some bought for the purpose. But some farmers do not make the most of it by any means, and of course are obliged to do with less stock in consequence. I always put wheat- or oat-straw chaff with corn for horses, but never any whole; but I keep cows before calving on either wheat- or oat-straw, or *barley if it has clover in it*, whole, giving a little cake, about 4 lbs., once a day. After calving, I give generally straw- and hay-chaff, with linseed and rice-meal, twice a day, and hay besides. I prefer cows before calving to eat straw whole, as it saves labour, but afterwards I advocate giving chaff mixed with some kind of meal. A neighbouring farmer chaffed the whole of his hay and straw, giving the cows nothing but chaff mixed with meal during last winter, and they did exceedingly well. If cattle are littered with cut straw, the manure will, of course, drill after getting rotten; but I do not approve of using much straw for litter if it is fit for feeding. I prefer sparred floors or perforated bricks, which greatly economise straw; but, of course, some straw is occasionally absolutely necessary. If straw were more extensively employed as food, I think cattle might be increased ten to the 100 acres, and in some cases certainly less hay might be made were straw used for feeding as much as it ought to be."

Mr. F. Sowerby, of Aylesby, Grimsby, appears to be of

Professor Buckman's opinion, and would prefer to sell straw and replace its value on the farm by the purchase of artificial manures. He says:—

"Our great difficulty in Lincolnshire is getting the straw made into good manure without losing money. I think there are no feeding properties in wheat- and barley-straw; in consequence we are obliged to buy a great quantity of artificial food to keep the cattle improving. It would be much more profitable for farmers living near a railway or large town if they were allowed to sell a portion of their straw, and buy extra quantities of artificial manures in return. If straw were more generally used as food, stocks of cattle might be considerably increased; but with no profit to the farmer, as wheat- and barley-straw have no feeding properties. Straw is employed in this district, about half-and-half. Wheat-straw for litter, and spring-corn straw for food. Store cattle have straw in yards *ad libitum.* Horses eat oats cut in chop. Sheep use very little straw. It is used for cattle; partly chaffed and partly whole; but when chaffed, it is mixed with one-third or one-fourth hay, and all used entirely uncooked."

Mr. G. Bland, of Coleby Hall, Lincoln, gives very similar testimony as to the proportions in which straw is employed as food or for litter in Lincolnshire. He says:—

"Barley- and oat-straw is all used for food, wheat-straw for litter. My cart-horses live on chopped oat-straw, with an allowance of corn; store beasts on all straw, with a little linseed- or cotton-cake, and a few roots; a small quantity for feeding beasts, very little for sheep.

"I use more chopped when it is very scarce, but I think it better whole.

"It is desirable to give straw chopped and mixed with hay or pulped roots for feeding cattle, and chopped small for sheep. A great deal is used about this district with a little cake, either linseed, cotton, or rape, frequently mixed."

Another correspondent says:—

"In Lincolnshire many cattle are wintered upon straw, with an allowance of linseed-cake or turnips. Straw cut will provide more litter. The expense of cutting would not be economical. Saw-dust is now much used as litter for horses and cattle. If straw were more extensively employed as food, stocks of sheep and cattle might be increased about 25 per cent. As to the system described in the 'Journal' by Mr. Jonas, it has been tried, and in some instances found to answer well; still it is now nearly abandoned."

Mr. Charles Beaven, Shipton Moyne, Tetbury, not only feeds straw largely on his own farm, but provides a number of cattle to consume the straw of his neighbours in winter. He says:—

"I give straw whole, and the cattle consume about three-fourths, leaving the butt-ends, they being coarse and gritty, from the character of the soil, which is wet sand; the remainder being used for litter. Generally about 3 lbs. or 4 lbs. of linseed-cake are consumed with the straw by each animal per day.

"To horses I give chaff, with corn, bran, and pulped roots. To cattle I should decidedly give whole straw, unless very clean and good, which then, with a portion of hay, may be chaffed and fermented with *crushed linseed,* corn, meal, cotton-cake, treacle, &c., or a condiment mixture, which may be very easily put together.

> "Many of my neighbours grow a quantity of straw, and have but few cattle, so that I am in the habit of filling their yards and boxes with cattle (say from thirty to forty every season). I give them 4 lbs. to 5 lbs. linseed-cake (best) each per day, per head, and that is considered equivalent to the value of the straw and the expense of serving, and I find my cattle do well. The winter of 1876–7 being exceptional, I have been giving 2 lbs. per head per day of Indian corn or barley-meal in addition.

This system of sending cattle for winter-keep into other people's strawyards is, of course, by no means a singular one. Some of our largest and best dairy districts have very little or no arable land attached to the farms, and it has always been more or less customary for the milch-cows, when dry in winter, to be sent out to straw-keep into other localities. But they used to be taken in at a small charge, about 2*s.* or 2*s.* 6*d.* per week per cow for straw and attendance. A far better method is now adopted rather extensively, very similar in details to the one described by Mr. Beaven. The dairy-farmer supplies cows and oilcake, the arable farmer straw, with yard-room and attendance; no money passes between them, yet both find themselves profited by the change. It costs the farmer in oilcake about the same he used to pay for his straw-keep, and probably a little less, if cotton-cake be given; but his animals keep the flesh on their bones, and come home to calve in excellent thrift, to yield milk far more abundantly than they used to do the first quarter. The owner of the strawyard realises a good return in more valuable farmyard-manure, which used to be poor stuff indeed when the cows were fed on nothing but straw. As, however, in backward districts the old system is still much more generally practised than this reformed modern one, the advantages and gains of the latter can scarcely be too prominently held up to view.

According to Mr. Edmund Rich, there is a tolerably large consumption of straw as fodder in Gloucesterhire. He says:—

> "Oat-straw is almost invariably given in the winter time to dairy cows when dry, also to two-year-old beasts and working oxen when out of work, to eat the best parts of it. The same may be said of good barley-straw; but probably at least half of the bulk remains for litter. Pea-straw is used in the same manner. Wheat-straw is but little used for fodder, except to cut into chaff for horses. Occasionally, but not often, straw-chaff is given to sheep with artificial food. Straw is employed, entirely uncooked; but it is occasionally given with pulped roots. Young beasts, as also other poor cattle, are often almost entirely kept on straw in the winter time. I do not think that straw could be more extensively used *profitably* in this neighbourhood than it is at present by the great majority of farmers."

Mr. C. Randell, of Chadbury, Evesham, who won the Worcestershire Agricultural Society's first prize last year, for having the best managed farm in that county, and whose advanced farming practices have, on several previous occasions, been dilated upon in this 'Journal,' is an advocate for much more straw being utilised in feeding stock than what is commonly deemed necessary. The subjoined particulars of Mr. Randell's experience in the conversion of straw into beef, which he has been good enough to furnish me with, will afford invaluable evidence in determining the value which should be placed on that article for feeding purposes on heavy-land farms; while his method of winter-feeding sheep in yards, the sheds of which are supplied with burnt clay instead of litter, not only helps to elucidate the primary difficulty of keeping sheep in winter on clay farms, but admirably illustrates one of the main points in the present inquiry. Mr. Randell says:—

"After having heard how readily and profitably straw, aided by roots, cake, and corn, is converted into beef in Norfolk, and other root-growing counties, and the manure, essential for the reproduction of the means of carrying on the process preserved, you may like to know how the occupier of a clayland farm) where to attempt to grow turnips is in the opinion of some good practical farmers in the neighbourhood a sufficient qualification for a lunatic asylum), tries to convert his straw into manure which deserves the name without serious loss.

"I have 15 two-year-old steers feeding, 25 milking and in-calf cows, 2 bulls,	These with their manure are entirely under cover.
6 two-year-old heifers, 15 yearlings,	In small yards, shedding spouted.

"These 63 animals consume daily as follows:—

"As much steamed chaff, one-fourth hay, three-fourths straw, as they will eat.

	£	s.	d.
4 bushels Indian corn, costing	0	14	0
1¼ cwt. decorticated cotton-cake	0	12	6
1 cwt. bran	0	5	6
1 cwt. malt-dust	0	5	6
½ bushel Black Sea linseed (boiled)	0	4	6
	£2	2	0 per day

for purchased food only. Now this cannot pay in the shape of a direct money return, and can only be excused by estimating highly the value of the manure—an estimate which will be fallacious or otherwise in proportion to the extent to which the manure is protected from rain. If it be made in large open yards, with the surrounding buildings unspouted, the loss is certain; in small yards, where the open space is not—and it should never be—more than as five to two of the spouted shedding, it is questionable; but in covered yards the cost of food may be recovered, while only one-half the litter is necessary, thus economising straw and carting; for it is obvious that a much smaller quantity per acre of this concentrated and unwashed manure will be required for any crop. The cattle, too, so protected, will give a greater increase for the food consumed.

"It will frequently happen that by rigid economy in the use of hay—the most expensive food, looking at its selling value, that a farmer can give to his cattle—he may be able to sell some to cover in part the cost of purchased food.

"But if clay-land will not grow turnips, it will grow mangolds, cabbages, tares, clover; and these crops, eaten by sheep, will give a more satisfactory return than can be obtained from cattle. In my case the clover, with at first pulped mangolds, chaff, and cake, or corn, and tares, carry the 300 breeding ewes with their lambs until the latter are fit to wean, and the early cabbages are ready for them; and these, succeeded by later kinds, all fed off where grown, last till October, when the sheep should be off the land and wheat sown. They then go into yards having sheds, the floors of which are covered with burnt soil as often as necessary. This accumulates until, in the spring, it is often 3 feet deep—a valuable manure. Their food there is pulped mangolds, wheat-chaff, and malt-dust, one mixture; clover, chaff, Indian corn, and cotton-cake, another. It is not often that this burnt soil can be had for the spaces outside the sheds—straw does very well; but if neither can be spared, we use tan. When straw is sufficiently abundant, sheep will do without any other litter, and make very good manure; but only enough to keep them clean should be used daily, so that the whole may be compressed by treading, and fermentation prevented. The feet of the sheep should be pared every six weeks—if these two precautions are observed they will not be lame. The ewes are wintered by hurdling off the grass-land that had been mown or grazed by dairy-cows, and have an allowance of cut chaff, Indian corn, and decorticated cotton-cake."

Mr. Randell also pronounces the opinion very decidedly that, by the employment of more straw in conjunction with artificial food for feeding purposes, which the provision of covered yards would save from littering purposes, double the number of cattle might be kept. The subjoined remarks of his likewise bear on other ways of economising litter. He says:—

"With the aid of purchased food, combined with straw, the stock of cattle might be doubled, provided that litter were economised by covered yards—this does not apply to sheep. With the increased stock so kept, as much hay as is now grown would still be required, or might be sold to pay for food purchased. Hay is the dearest of all food. No doubt littering cattle in boxes with cut straw is right; it is only a question between boxes and covered yards. I do not believe in sparred floors or pavements. Sawdust or tan may supplement straw—not be entirely a substitute for it."

Mr. Finlay Dun, Weston Park, Shipston-on-Stour, remarks:—

"Twenty years ago 30s. per ton was the ordinary price throughout Warwickshire for wheat-straw, which during the present season is procurable with difficulty at 80s., whilst in the neighbourhood of Leamington many sales have been made as high as 100s.

"This increased value of straw during the last few years, and the quantities forwarded to the larger towns, have induced farmers to be greatly more careful than formerly of straw, which is now economised for litter—fern, leaves, sawdust and burnt earth being occasionally substituted for the expensive wheat-straw. For the same object, yards have been reduced in size, spouted, and in some cases covered over. Double the amount of straw is now cut into chaff that was used in this way ten years ago; the straw is sometimes mixed with about one-fourth of hay; but where roots are grown they are pulped, or cut fine and mixed with the straw-chaff. This is the chief food of cattle on most well-managed holdings, supplemented by cake or corn, more liberally supplied as feeding advances. Older cattle receive less and less of the costly hay, which is reserved chiefly for calves and milking-cows. Many flockmasters also use

> straw-chaff for all except their forward feeding-sheep, rendering it palatable and nutritive by admixture with concentrated food, pollards, or crushed grain. In the cattle-yards of Warwickshire many superior two-year-old beasts are successfully wintered on 10 lbs. to 15 lbs. straw-chaff; an equal weight of cut roots; about 3 lbs. mixed linseed- and cotton-cake, with a supply of barley- or oat-straw, placed in the racks twice or thrice daily.
>
> "The high price of hay has further led to the more extended use of straw for the feeding of horses. For hard-worked farm-horses it is well to use about one-fourth of hay. Of this mixture horses weighing 15 cwt. will eat daily 20 lbs., and 20 lbs. of mixed corn, such as oats, pulse, and maize; and with a few roots or bran may be kept, with a very small modicum of hay, and at a less cost, in better condition and more free from disease than when allowed an unlimited amount of costly hay in the racks."

Mr. R. H. Masfen, of Pendeford, Staffordshire, says that in his district straw is disposed of in the proportions of about one-third for food and two-thirds litter for stock. He is in the habit of cutting straw into chaff for horses, cattle, and sheep; besides which, both cattle and sheep have some uncut straw always placed before them in winter, to pick from at pleasure. He is accustomed to steam straw-chaff for horses and cattle, and considers that the animals much prefer to have it in that state, and also fare better on it than when uncooked. As to saving litter, he states that placing chopped straw in boxes is more in accordance with his ideas than compelling cattle to lie on sparred floors, as stock are apt to get knee-sore by constantly having to lie on so hard a bed.

The subjoined statement illustrates another method of utilising straw as food, considered to be adapted to Herefordshire and the counties bordering on Wales. One of my correspondents writes:—

> "Straw is much used in the grass-portion of our part of England, and with good effect. If the horned cattle are well bred, they do exceedingly well out in the old-fashioned fields in the cold wet autumn and early winter, with nothing but the short, wet, frosted grass, and a waggon-load of clean wheat-straw in the field, for them to eat, not to lie upon. But straw as the only food, or nearly so, should never be given to cattle tied up, or it may cause stoppage; but only to those who have plenty of room to move about in, and plenty of water always at hand. The above applies to well-bred Shorthorn cattle chiefly. The Irish and low-bred cattle do not appear to thrive on this method (though it is very common in our neighbourhood), but they generally lose some of the little flesh they have. I have myself kept many well-bred Hereford in-calving heifers and others, on barley-straw well threshed out, and nothing else, except plenty of running water, every winter and spring for years, and they gained flesh on it.

Mr. Thomas Oldaker, agent to the Rev. Archer Clive, the well-known breeder of Hereford cattle, states that in the district around Whitfield, Herefordshire, about half the straw is used for food and half for litter. Mr. Oldaker himself uses sawdust as litter. He further says:—

"I give about one-third to horses, half to cattle, and only a small proportion to sheep. It is chaffed, and entirely uncooked; but when roots are plentiful, some root-pulp is mixed with it, and allowed to remain twenty-four hours before it is used.

"Straw is generally given in this district, mixed with hay without any preparation. It is occasionally given almost entirely to store-cattle, that have a pasture to run over through the winter; but it usually keeps them in poor condition."

Mr. T. Duckham, of Baysham Court, Ross, the editor of the 'Hereford Herd-Book,' is of opinion that straw might be much more extensively employed in feeding cattle in conjunction with richer food. He says:—

"Certain remarks which I made, in a paper read before the Breconshire Chamber of Agriculture in 1869, apply directly to your questions, and I cannot do better than reiterate them. The food for fattening-stock should be occasionally changed. My system is an allowance of best quality linseed-cake, from 3 lbs. to 5 lbs., given the first thing in the morning, and followed by three feeds during the day, of chaff, meal, and pulped roots, and a little hay in the rack at night. I like to reduce all corn to a fine meal, and mix it with the chaff and pulped roots, twelve hours before using, when a slight fermentation will take place. That animals, like ourselves, are fond of a change of diet may be readily conceived by the eager manner in which they will frequently eat their litter when fresh. The year 1864 was one of great trial to the stock-owner: the short supply of hay and failing crop of roots rendered it impossible to carry out my usual system, but the low price of corn and prospect of high prices for beef induced me to substitute straw for hay, and, in the absence of roots, to make linseed-tea, which was applied boiling hot to the straw-chaff, and the meal and a little salt were added. This, with a little hay in the rack at night, constituted the food. I never knew steers and heifers feed faster than under that system. Steers 2 years 8 months old went out at 30*l.* each, and one at 2 years 3 months old at 28*l.* I have for several years past given large quantities of straw-chaff and pulped roots to my store cattle, and the experiment of that winter proved to me that much more meat can be made than is usually the case, by economising straw and making it a vehicle of conveying the more nutritious and fat-forming diet. We must look forward to covered homesteads, which will allow more straw to be employed as food."

Mr. Thomas Simons, writing from the Dunstable district, states that about one-third of the straw is used as food: describing his own practice, he says:—

"I give straw to horses chaffed, to cattle chaffed and whole, to sheep chaffed about 10 bushels to the 100 per day. The horses have it mixed with the corn, and eat as much as they like, each horse being racked-up with 14 lbs. of hay at night. Store-beasts in this neighbourhood usually have it whole; all other animals chaffed. When hay is very dear it is often the principal food, with cake or corn. I have used straw-chaff for my horses mixed with bran, and corn without any hay when that has been dear, and found them do well."

Mr. J. Stratton, describing the state of things in the Marlborough district, Wilts, writes:—

"Wheat-straw is used very little in this district as food for stock. Barley- and oat-straw are used to a considerable extent for cattle, and cut into chaff for horses and sheep. Bean- and pea-straw are consumed almost exclusively by sheep, though I think its value is under-estimated. No doubt much more stock could be kept on straw, with corn, cake, or roots. The market value of straw not being very high here, we require no substitute for litter. I know only one or two farms where Mr. Jonas's system is adopted; no doubt it is a good plan."

Mr. F. T. Ivimy, of Basingstoke, Hants, considers that about one-half of the straw in his district is employed as food, and adds:—

"The cart-horses have as much oat-straw as they can consume, also the beasts in the yards, but in both cases whole. I should say the consumption of cut straw in loose boxes would be greater than if it were used whole, and as it would be more difficult to remove, there would be no economy. Wild ferns are often used by small farmers as litter."

Two correspondents, neither of whom gives name or address, speak favourably of Mr. Jonas's system of chaff-storage. One remarks:—

"The method has been adopted with good results, especially where hay is not plentiful and when the straw is good. When the root-crop is bad, straw is more valuable, and is more used."

The other gives his testimony:—

"Mr. Jonas's system of converting straw-chaff is a good one, and is found to be most advantageous; I have tried it with satisfactory results, the chaff being cut in the summer months for the ensuing winter."

An erroneous impression would seem to prevail that the system of cutting and storing straw-chaff originated by Mr. Jonas must necessarily entail a heavy cost in the process. Thus Mr. R. Vallentine, of Leighton Buzzard, gives me the following reasons why it is not adopted in his locality:—"The cost is considered too much; very few farmers could manage to cut straw into chaff under 1*l.* per ton, it would frequently be more, and could not under ordinary circumstances add so much additional value to a ton of whole straw."

But farmers in other places are accustomed to cut straw into chaff at a cost of about 6*s.* a ton, and in Stephens's 'Book of the Farm' it is stated that the operation can be effected at a still lower rate by steam power. But this topic need not be enlarged upon, as the statement of Mr. F. M. Jonas, embodied in the present paper, shows that it is possible to carry out his method so as to realise a considerable saving on the ordinary method of stacking straw as it is delivered from the threshing-machine.

From the foregoing replies to my questions it would appear that great diversity of practice exists as to the relative proportions in which straw is utilised as fodder and litter. This is only what might naturally be expected. Deep fertile soils produce grain crops very rank in straw, the coarse stalks of which naturally contain much indigestible woody fibre. This is probably why, in some parts of Lincolnshire and Yorkshire, it has been customary to place uncut straw fodder before stock so as to allow them to select from the bulk just a little of the best of it while being fed on richer food, instead of going to the expense of chaffing and preparing a diet of mixed ingredients, which in localities producing sweet straw of finer texture is held to be desirable. On many black soft soils, and particularly those very peaty in nature, the straw usually appears more spotted and dark than in other districts, and cannot be so well adapted for fodder in consequence.

Johnson's 'Encyclopædia' contains the following in support of this view:—"The value and qualities of the straw of the different cereal grasses vary considerably according to the soil and season. It is thought that when grown on gravelly or rich clay soils straw is more valuable as fodder than when it is raised on black deep loam or cold moory land; and it is now generally admitted that it possesses more succulence when the corn is rather green than when it is in a riper state."

Considerations of this kind help us very much to understand why Mr. F. Sowerby should pronounce that of only slight value as a feeding material in Lincolnshire, which Mr. F. M. Jonas, in Essex, and Mr. J. Ford, in Dorsetshire, appreciate so highly. As a rule, the chalks, gravels, and clays, tolerably rich in minerals, but deficient in organic wealth, produce much better straw for feeding purposes than districts much more famous for natural fertility.

Probably there exists another sufficient reason for straw being valued more for the higher object it is calculated to serve on many second or third-rate soils than it is found to be when grown on richer lands. The hay crop costs more per ton to produce on poor than on good soils, and when obtained is nothing like so valuable. Many farmers will be found ready to state that haymaking, in their respective cases, is calculated to confer only slight advantages, and might be very greatly curtailed without involving any sacrifice worthy of the name. For while the hay their farms yield is often possessed of little more feeding value than sweet wholesome straw, the latter, in conjunction with oilcake, affords a very efficient substitute for hay in feeding all kinds of cattle and sheep; and in numerous instances hay is abandoned altogether in the feeding of horses. By importing the use of straw and oilcake extensively into the winter-feeding, farmers are able to dispense with making much hay, and the expenses saved thereby enable them to run up a heavy cake-bill to the great advantage of their stock, their manure-heaps, their grain crops, and their own ultimate prosperity.

But here I am met with a question which is put very plainly by one of my correspondents, namely, Mr. C. Beaven, who says, "You could undoubtedly feed more grass-land, but I do not advocate entirely doing away with haymaking to depend on straw, as in case of bad harvest-weather, with straw damaged, and, in some cases almost rotten, what would you do?" Taking the average of years, there are many more wet hay harvests than grain harvests, the weather, as a rule, being finer and more settled in August and the early part of September than in June and July. In bad seasons for stacking corn they have, too, in some districts, a mode of putting the sheaves into wind-ricks, which, if more generally adopted, would prevent both the grain and the straw from being completely spoilt. Then, again, badly taken fodder, whether hay or straw, is often only unpalatable to stock because of a "must" or "fustiness," which steaming or even a slight fermentation is calculated to remove. I have seen hay which was absolutely white with must, come out of the hopper, after being chaffed and steamed, with a fragrant aroma which caused it to be eaten with avidity by fattening-stock. Farmers in general are tolerably sure in the worst seasons to have some straw they can utilise for fodder without difficulty, and they would not risk much by placing less dependence on hay; although there is, of course, this to be considered, that he who has two strings to his bow may possibly be able to use one should a mishap occur to the other.

As the results of chemical analysis, Dr. Voelcker has placed the nutritive values of different sorts of straw in the following order:—1. Pea-straw; 2. Oat-straw; 3. Bean-straw with the pods; 4. Barley-straw; 5. Wheat-straw; 6. Bean-straw without the pods. The testimony of practical farmers has pretty generally endorsed this classification. Pea-straw has always been considered too valuable to be used as litter, and it generally falls to the lot of sheep, those animals being particularly fond of it. Nearly all my correspondents set a higher value on oat-straw than on any other white straw for feeding purposes. There is less unanimity with regard to the virtue of barley-straw, attributable, no doubt, to the fact that its feeding value is not unfrequently materially increased by the large quantities of young clover mown with it. When there is little of this it very often sinks below wheat-straw in the scale of value, owing to the usual and almost invariable practice of over-ripening the barley crop. The custom of doing this cannot, of course, be argued against, as the grain is improved thereby for malting purposes; but both corn and straw of wheat would no doubt be improved if farmers could only more generally be induced to take the crop from the ground somewhat earlier than they are accustomed to do at present. No kind of straw, probably, differs more materially in value than that of the bean crop; and none admits of being heightened in quality by the beans being either cut or pulled while the stalks are green, and before the leaves have all dropped off. When beans grow to the height of seven or eight feet, as I have sometimes seen them, the stalks, of course, are like sticks; and, should the crop be allowed to get dead ripe, would be very ill-adapted to yield food without being chaffed and steamed. But if the Russian or winter bean be cultivated, which is short in the haulm and ripens in July, and if the crop be taken from the soil early, while yet green, an exceedingly valuable straw for foddering or chaffing purposes would naturally be the result. One of the best farmers in South Hants used to be very fond of having his winter beans pulled up in that condition and placed in rows of stooks after being sheaved. This allowed the land to be cropped with turnips, and I have often heard him declare that while he obtained a fairer sample of grain worth several shillings a quarter more than ordinary samples, the bean-straw was also rendered of great value in affording material for utilisation as food for stock.

Who can doubt that when farmers find it to their interest to care more than they now do about straw produce, so as to secure it in a condition better adapted to serve for fodder, similar tactics will be employed in harvesting all crops, with the exception, perhaps, of barley? Nothing more, surely, need be stated as to the advantages of cutting oats early; and yet there is another point materially bearing on the matter which has not yet been mentioned. Oat-corns adhere 'to the plant by so frail a thread that if the crop be allowed thoroughly to ripen large numbers of them are tolerably sure to bret out by the first strong wind which blows. Every experienced man knows how hazardous it is to allow oats to remain uncut after the straw begins to turn off in colour. There is consequently every inducement to harvest that crop early. When also it is considered to what an extent both the grain and the straw of wheat are improved by the cutting being effected just at the period when the corns no longer emit a milky juice, common sense naturally points to the proper course of action. All these things vitally affect the issue, and we shall perhaps soon find even the occupiers of the Fens and our richest alluvial soils, ready to admit that by altering their course of action slightly, in taking their grain crops from the ground earlier than they have hitherto done, a great deal more may be made out of straw. The farmers of Lincolnshire who, by growing grain crops bulky and coarse in straw, fancy there is little feeding virtue in it, are still accustomed even now to utilise no small portion as food, by their stock being allowed to pick out of large quantities the tit-bits and stalk-tops. By adopting earlier cutting they would, no doubt, find a means of economic management hitherto only partially explored.

Nor must it be forgotten that however much the coarseness of texture and the condition of the straw of different districts may affect their value for feeding purposes, the best of the best would not be worth much given singly, without the addition of rich substances, such as oil-cake or corn-meal, with root-pulp, or roots, should the latter be plentiful. Only as an ingredient in a mixed dietary for stock, can straw yield fully the advantages it is capable of rendering as a food substance. This does not imply that straw should be utilised in this way or that. Many farmers like to save expense; and it is natural, perhaps, that the material, when exceedingly abundant and not of the finest texture and quality, should be given whole and in large quantity; but still, if the animals are at the same time fed with sufficient liberality on richer substances, so as to keep them laying on flesh actively, or yielding milk bountifully, or if young, in active growth and thriving condition, the principal object will be attained.

However strange to the ears of some it may sound to hear of beef, mutton, or butter being derived as the direct result of feeding on straw, this appears to be the most economical way of producing either of those high-priced articles in winter, provided that straw forms one item only in the dietary, of which the other items should be roots and oil-cake, or corn, as a rule, but varied with other rich and suitable ingredients if they be cheaper to purchase, or more adapted to the wants of the animals.

Mr. Mechi says:—

> "If we are to consume all our bean-, barley-, wheat-, and oat-straw, we must keep our animals on sparred floors, or on burnt clay, and we must invest more capital in animals. We shall then make much more meat per acre. If a ton of straw will make 40 lbs. of meat, and if 2 tons of straw are grown per acre of our cereal and pulse crops, it would be four score pounds of meat per acre over the whole of the cereals and pulse."

Of course Mr. Mechi did not mean that it is possible to make so much meat out of straw, unless it be given in conjunction with auxiliary feeding stuffs; for immediately afterwards, to quiet any apprehensions as to the manure-heap being lessened in value, he says, "Your animal, by this mode of feeding, consumes 560 lbs. of rape-cake with every ton of straw."

Dr. Voelcker, and other scientific experts, have, I believe, sufficiently proved by chemical analysis, that a ton of straw possesses sufficient nutritive properties to yield this amount of beef, but an animal could not eat enough straw to keep the machinery going without the addition of richer feeding substances. The whole virtue would be taken up in supplying heat to the system, and repairing the waste of the tissues, &c. But when straw is used for bulk and oil-cake and other substances to improve the quality of a mixed dietary, it is only reasonable to give the straw credit for what it supplies towards the beef-making, and this appears to be what Mr. Mechi has actually done.

Mr. Horsfall, in vol. xviii., page 171 of this Journal, observed, "In wheat straw, for which I pay 35*s*. per ton, I obtain for 1*s*. 2½*d*. ·50 oil and 32 lbs. starch or (the starch reduced to oil) 18½ lbs., available for the production of fat or for respiration. I know no other material from which I can derive by purchase an equal amount of this element of food at so low a price. The value of straw calculated as manure is 9*s* 7*d*. per ton."

But Mr. Horsfall gave this as scientific evidence, fully accounting for his success in a particular system of feeding dairy cows on a mixed dietary, the chief items of which were rape-cake, malt-combs, bran, and straw-chaff of different kinds, all intermixed and steamed or cooked before being employed. The results were so important, that his cows gave more bountiful yieldings of milk, and of far higher quality, than they had done before, and put on flesh rapidly, even to getting quite fat while in full profit. His cream was of so thick a consistency as to admit of laying a penny piece on it without sinking, and it yielded a far larger proportion of butter than ordinary cream. Casting about for reasons to account for all this, he found them in a comparison of the chemical analysis of the mixed nutritive substances supplied by him, with that of the food commonly supplied to dairy cows. His researches led him to see that even the best hay is not a food good enough for a milch-cow to enable her to do her best, and he said, "You cannot induce a cow to consume the quantity of hay requisite for her maintenance, and for a full yield of milk."

Mr. Horsfall fully proved, both scientifically and practically, the greater economy of feeding milch-cows on straw-chaff, rape-cake, malt-combs, &c., rather than on hay; but the immense value of straw to him consisted in his system allowing the full amount of nutritive properties it contains to be appropriated. That this was his own view, appears from the following:—"I am satisfied the most economical use of food rich in albuminous matter, is together with straw or other materials which are deficient in this element."

Of course any material increase in the employment of straw as food for stock would admit of larger herds and flocks to the acreage. Mr. Mechi relates that his labourers often say, "Ah, master, you could not keep half so much stock as you do if you did not consume your straw;" * and he adds "If I could have my own way I would consume every particle of my straw, and I do consume a great deal; but then I should have to largely increase my capital invested in live stock, and purchase food which I cannot afford. At present I have only a portion of my cattle on sparred floors, and the remainder in covered and enclosed yards with paved floors, the latter only requiring one-fourth as much straw as the open yard; but if I could afford to have more cattle, I would put them all on sparred floors, for twenty years' experience has proved it to be a profitable system . . . . My experience has taught me that the more live stock I can afford to keep fed to fatness by the consumption of cake and other food not produced by the farm, aided by an abundant supply of finely comminuted and prepared straw, is the true and cheap way to produce abundant manure of the best quality."

For the sparred floors Mr. Mechi prefers 2-inch openings and 3-inch laths, to 2½ openings and 2½ laths, and says: "the former are easier to the animal's feet, and besides, although the foot is 4 inches wide, the hoof is wedge-shaped from front to back. For calves I find 1½-inch openings answer well."

Anyhow, something will have to be done to obviate the necessity of so much straw being employed in littering stock. Apart from the food question, the market price has risen so much in many localities, that it has already become a popular notion that no greater boon could be rendered to a large proportion of the farming community than the abolition of restrictions in agricultural covenants, and of those customs of the country having the force of law, which prevent the sale of straw. The Scotch newspapers lately asserted that Holland has commenced sending straw largely to Scotland in compressed bales, and that the demand for the article has so greatly increased during the past year that the price, delivered from the ship's side, has risen from 65*s.* to 95*s.* a ton. In Staffordshire 6*l.*, and even 7*l.* a ton, has been given for straw within the past year. In the neighbourhood of Wolverhampton straw has become the most valuable part of the crop, and I have heard of farmers there who are accustomed to sell nearly the whole of the straw and hay they grow; and they force a heavy produce of straw by abundant dressings of nitrate of soda.

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* 'Profitable Farming.' By J. J. Mechi. Routledge and Sons.

There is good reason, therefore, for assuming the correctness of Professor Buckman's view, that in many districts straw might be sold remuneratively by the farmer, and with great gain to the fertility of the farm, if replaced by artificial manures. The manurial value of straw is only between 9*s.* and 13*s.* a ton, so the chemists tell us. Dr. Voelcker, it is true, in his paper, published in the 'Journal' for 1861, considers straw to possess a higher value as a fixer of ammonia when used for littering than for its own inherent properties. But are there not other and cheaper agents for accomplishing this object, such as ashes and charred or burnt earth? Those acquainted with the merits of Mr. Moule's dry-earth closets must be well aware of this, and Mr. Mechi is in the habit of speaking of the risks of fermentation being lessened by the absence of straw from farmyard-dung, provided only the excrements be mixed with burnt earth. He says:—

> "I attach great importance to these open floors, they will enable us to keep almost any amount of stock. The manure requires no turning or fermenting; there is no expense of littering or frequent removal, and no loss of ammonia by fermentation. The comfort is great in every respect. Burnt earth is a necessary auxiliary to boarded floors. Gypsum is also useful; a little sprinkled every morning on the boards being highly beneficial: about a peck to ten bullocks."

Of all means for saving litter popular opinion, no doubt, endorses with most approval covered yards; and, probably before long, demands will more generally arise to have both these and covered rickyards, that farmers may husband their produce with slight cost and less dependence on manual labour. An immense sacrifice of straw takes place in every open yard for feeding cattle, greatest, of course, where the eaves of outbuildings are unspouted. These, enclosing the yard, pour down in wet weather a large addition of water to that which falls into the yard direct from the clouds. But, under the best circumstances, the waste of open yards is enormous. Mr. Evershed, indeed, calculates that in the feeding of 50 head of cattle for six months, 100 tons of straw might be saved in litter by placing them in covered instead of open yards.

There is a great deal of available waste materials either on the farm or in its neighbourhood, which, if gathered and taken care of, might be made in many cases to serve the entire littering requirements of the covered yard, and save a vast quantity of straw from being used in open yards and cattle-houses. Thus, large quantities of dry leaves might be gathered at the close of autumn in many places, which, if thatched over, would go a long way in littering. In the neighbourhood of commons it would not be difficult to make a large rick of fern, and, in districts bordering marshes, sedges, flags, and rushes may be collected cheaply in almost any quantities. A great deal of rubbish on the farm itself might also be utilised for littering. Some years since, having to clear a piece of very foul land, I had a great many loads of the weeds carted to the homestead and thatched over, and these proved a serviceable store for littering purposes the next winter. Trimmings of banks and fences might be preserved in the same way. Peat is also used largely for litter where it is close at hand, and the small farmers of one district in Belgium are said to entirely litter their cattle with parings taken from the surface of the common lands adjoining their farms, consisting mostly of heath-plants and the soil attached to their roots.

Sawdust seems to be almost the only substitute for straw deemed suitable for the stable; but I am not sure whether dry earth might not be made available for this purpose. Mr. Joseph Blundell, of Southampton, has recommended a plan of having an excavation, 2 feet deep, in that part of the stable where the horses stand and lie, always filled with dry earth to be renewed as often as seems necessary. This forms, he says, a bed quite soft enough for them, and he considers that horses are less liable to be affected with diseases of the feet than when they are littered with straw.

A great deal of litter might be saved in stables and cow-houses by having the floors paved, so that the urine would pass off rapidly by traps, and thus be carried away to tanks. One of the most perfect devices of this kind that I have seen is at the stables of Mr. Whiteley, at Bayswater, who does an immense trade in drapery and almost everything else the public requires to buy. He keeps more than a hundred horses, and his stables are admirably paved with hard blue paviors, each of which has a raised surface of eight small squares, with deep interstices. The pavement is all over in these small diamond-shaped blocks, and as there are two traps to each stall, one in the centre and one just behind the horse, the urine does not remain an instant for the litter to soak in.

The idea seems worth being thrown out as a suggestion whether Mr. Blundell's system of using dry earth or ashes might not be combined with partially sparred floors in cattle-houses where beasts are tied up by the neck. All the floors from the crib or trough back to about where their hind-legs come, might be excavated a foot or foot-and-a-half deep, and such excavations in a framing of wood, be kept filled up with dry earth. Behind this two or three stout spars might be laid down with openings over a drain to receive the droppings both liquid and solid, in the case of cows and heifers; but, of course, only the latter when bulls and oxen are tied up.

Littering requirements need not then stand much in the way of the utilisation of straw for feeding stock, which appears to be employed for that purpose much more in certain parts of the Continent than in this country. If the farmer requires more than ever to husband his resources to make his business remunerative, he can scarcely afford to neglect any longer this hitherto despised material, whose natural outcome, when rightly employed in conjunction with oilcake and other auxiliary feeding stuffs, is an increase of herds and flocks, and a more extended development of agricultural wealth.

The language of Sir John Sinclair, in his 'Code of Agriculture,' may still be employed, and with it I close this paper. He says: "The substance of straw is of greater importance than is commonly imagined, and the nature of that article taken in the aggregate entitles it to more attention than has hitherto been bestowed upon it. Farmers are apt to consider it as of little or no worth, because it is not usually saleable, and is rarely estimated separately from the yearly produce of the soil; but it has an intrinsic value as a fund for manure and a means of feeding stock."

IV.—*On the Composition and Nutritive Properties of Swedes, and Experiments on the Keeping Qualities of Roots.* By Dr. AUGUSTUS VOELCKER, F.R.S., Consulting Chemist to the Society.

IT is to be feared that farmers, in their anxiety to grow heavy crops of swedes, often lose sight of the great differences, in feeding and keeping qualities, between healthily developed roots, and large, watery, imperfectly ripened bulbs. It is perfectly well known to stock-feeders, that a ton of sound, solid, juicy, sweet-tasting swedes is worth a great deal more for feeding and fattening purposes than the same weight of watery, big, and comparatively tasteless roots. And yet, much thought is seldom given to a consideration of the conditions which are favourable, or the reverse, to the production of sound nutritious roots of good keeping quality. In too many instances, quality is sacrificed to quantity.

White turnips not unfrequently contain from 92 to 93 per cent. of water, and even in swedes and mangolds I have found occasionally as much; whereas, good fully matured swedes or mangolds seldom contain more than 88 per cent. of water, and frequently less.

In such watery mangolds, the proportion of dry or real feeding substance in 100 lbs., weighs only 7 lbs., whilst good roots contain 12 lbs. of dry food in every 100 lbs.; or in other words, 10 tons of the more nutritious mangolds are worth about 17 tons of the watery roots.

According to the character of soil, the mode of cultivation, the kind and quantity of manures used, the character of the season, prevailing climate in a district, and similar conditions, the composition and nutritive properties of all root-crops are subject to great variations. Swedes are no exception to this general rule, as will be seen by referring to the various analyses embodied in the pages of this paper. Even roots grown in the same field, under the same conditions, often vary much in composition, owing to the circumstance that mixed old and new seed has been sown, in consequence of which the roots are found, at a given period, in different stages of development.

In illustration of this fact, the accompanying analyses (Tables I. and II.) which I made of 12 swedes all grown in the same field may be quoted.

A glance at the first Table (No. I.) shows that the percentage of water in the 12 roots ranged from 83·22 to 89 per cent. The lowest and the highest proportions of water in these roots were rather exceptional, for good swedes may be taken to contain, on an average, from 88 to 88½ per cent. of water. With the proportions of water, the amount and relative proportions of the different solid constituents naturally varies considerably, a fact which appears more clearly when the composition of the roots is calculated in their dry state.

The second Table (No. II.) shows the composition of each root when dried at 212° Fahr.

Amongst other particulars, it will be seen that the proportions of sugar and analogous compounds in the different roots in a dry state varied, in round numbers, from 48 to 61¾ per cent., and that in the better specimens the proportions of these compounds constituted about half the weight of the solid substance of the roots.

The variations in the proportions of albuminous compounds also were great. Thus, whilst root No. 9 contained only 10⅓ per cent. of albuminous matter, No. 11 contained nearly 18 per cent. Minor variations will be noticed in the ash and other constituents, upon which I need not dwell. It is interesting to notice in these analyses, that a comparatively high percentage of nitrogen in the roots goes hand-in-hand with a correspondingly low percentage of sugar; and it will be further

noticed that the roots rich in nitrogen had a lower specific gravity than those poorer in this element, and richer in sugar.

Thus root No. 11, which in a dry state contained 2.865 per cent. of nitrogen, and only 48·023 per cent. of sugar and analogous compounds, had a specific gravity of only 1·003, and was scarcely denser than water; whilst root No. 12, containing only 1·905 per cent. of nitrogen and 54·927 of sugary compounds, had a specific gravity of 1·039. Comparatively, much nitrogen in swedes, and I may add all other root-crops, invariably indicates immaturity and low feeding-quality, whilst a moderate proportion of nitrogen and a high percentage of sugar in roots are certain indications of their superior feeding quality. The specific gravity, it will also be noticed, affords an excellent and simple means of judging of the relative qualities of different roots of the same kind. Advantage might be taken by seed-growers, more frequently than is done, of the circumstance that good sound and nutritious roots have a higher specific gravity than inferior bulbs.

A solution of common salt of the required strength, having, for instance, a specific gravity of 1·035 or 1·038, may be readily made, and by means of such solution a large number of roots may be tested as regards their fitness to produce good seed. All that requires to be done is to throw the roots in a tub containing a solution of salt of proper strength, and to reject those roots which do not sink.

The deterioration of our root-crops, has perhaps, been caused as much by bad seed, raised from roots of indifferent quality, as by bad cultivation or excessive manuring, if not more so. On the Continent, where sugar-beets are grown in great perfection, the greatest possible care is taken in raising seed from selected roots of a good stock; and undoubtedly it would well repay British root-growers to give a good price for turnip-seed, and to encourage seed-growers to raise seed from carefully selected bulbs more frequently than they do at present.

Besides the character of the seed, the quality of swedes is much affected by the variable nature of the soil upon which they are grown, the kind, quality, and quantity of manure employed, the system of cultivation, the character of the season, and the climate prevailing in different parts of the country.

Over climate, and to a certain extent over the soil, the farmer has little or no control. On the other hand, in the selection of suitable manures, and in pursuing a system of cultivation best adapted to the peculiarities of his land, a wide margin for skill is left. The selection of varieties most suitable for particular localities or particular classes of soils, likewise affords ample scope for the exercise of judgment, and presents a wide field for experimental inquiry.

All interested in root-growing are familiar with the fact that the distance between the rows, and between plant and plant, affects both the weight and the quality of the crops; and they further know that under some circumstances it is better to grow roots on the flat, and under others on ridges. On these, and similar questions of a purely practical nature, general directions are of no avail, and rather calculated to mislead than to afford useful directions for the successful cultivation of root-crops. The fact is that practical experience of this kind cannot be taught by lectures or written treatises, but must be acquired by close observation, careful comparison, and actual trials. All skilful and experienced agriculturists are of necessity experimenters in the best sense of the word. However, it will not be out of place to direct attention to the tendency which prevails in some districts to grow swedes too far apart in the rows, and to leave too wide a space between the drills. In bad seasons, roots thus planted do not properly ripen, and the weight per acre is often less than when they are planted more closely. Bearing on this point, some interesting experiments have recently been made in France by M. Ladureau. A five-acre field was divided into 5 equal plots. On each of these plots, furrows were run 17 inches apart, and sugar-beets were planted in the rows at intervals of 10, 12, 14, 16, and 20 inches respectively, in the several plots. The total yield per plot, and the chemical composition of the juice from the roots grown upon each, were carefully noted. The following Table embraces the principal results which were obtained.

Number of Plot	Distance.	Yield per Acre			Specific Gravity of Juice	Percentage of Sugar	Percentage of Ash
	Inches.	Tons	cwts	qrs			
1	10	28	0	0	1055·5	11·62	·665
2	12	27	12	3	1055·	11.21	·750
3	14	27	15	3	1050·	10·48	·750
4	16	25	1	3	1051·	10 61	·810
5	20	25	5	2	1046·	8·97	·820

From these results it appears:—

1. That the roots planted nearest together, viz., at a distance of only 10 inches, not only gave the heaviest crop per acre, but also yielded a juice richest in sugar.

2. That the difference in yield between 28 tons per acre on plot 1, and 25 tons 1 cwt. 3 qrs. on plot 4, was entirely due to

the difference in distance from each other at which the roots were planted.

3. That the specific gravity of the juice decreased as the distance between the plants was increased.

4. That the proportion of sugar in the juice varied with the distance between the plants, from 8·97 per cent. in plot 5 planted 20 inches apart, and 11·68 per cent. on plot 1, where the roots were planted only 10 inches apart.

On the Continent, no doubt, one of the benefits of planting sugar-beet rather close is to protect the land against undue evaporation of moisture; but the chief reason of planting closely is to induce early maturity of the roots. Of course, the distance at which sugar-beets give the heaviest and richest crop in one country is no guide whatever to growers of swedes and turnips in this country. As a rule, it will be found that mangolds are planted quite as wide apart in England as swedes and turnips, if not wider; and I believe this is one of the reasons why the mangold crop generally is taken up from the ground in a less mature condition than swedes, which may be left much longer in the autumn in a growing state in the soil than mangolds. My chief object in referring to the experiments of planting sugar-beets at different distances is to direct attention to the circumstance that too wide a distance is unfavourable to early maturity. This is applicable in a smaller or larger extent to all root-crops, varying with the character of their foliage and the system of manuring that is practised, as well as the nature of the soil in which the roots are grown. I believe it is not a good plan to plant swedes too wide apart, and I have frequently heard the same opinion expressed by our best practical men. In many cases a larger crop, and of better quality, would be produced on many soils in England if swedes were planted closer. Strictly speaking, the argument founded on the growth of sugar-beets in France does not apply in its integrity to swedes grown in this country. Although it places in perhaps too strong a light the benefits resulting from close planting, and is thus not applicable to the same extent to swedes and turnips grown in England, it has to be borne in mind that I give no directions as regards the distance at which swedes should be planted, and that my object in calling attention to the French experiments is to show that roots mature more readily when planted closer, and often yield a heavier crop per acre, than when they are planted too wide apart.

The character and quality of the manures employed in growing roots have a powerful influence on their composition and feeding-qualities. Land highly manured with rich dung made in fattening-boxes or stalls induces luxuriant and vigorous growth, but at the same time has a tendency, if too liberally used, to develop over-luxuriance in the tops. This is more particularly the case if the dung is derived from fattening-beasts liberally fed upon oilcake and artificial food rich in nitrogenous constituents. If the autumn turns out fairly dry and mild, the roots on highly manured land continue to grow vigorously; and if the weather in September and October continues warm and dry, a heavy weight and fairly ripe roots result from the liberal use of rich dung. But should the autumn be cold and wet, the roots do not get sufficiently ripe; they remain watery, deficient in sugar, and altogether less nutritious than they would have been had a more moderate dressing of dung been put upon the land. The chief cause of the immature condition and low feeding-quality of roots grown with an excessive dressing of rich dung is due to the large amount of ammoniacal and readily available nitrogenous matters which is supplied in the dung. Numerous field experiments have shown that the peculiar tendency of salts of ammonia and readily available nitrogenous matter is to produce luxuriant leaf development and vigorous and prolonged growth, which in our fickle climate frequently results in a more or less immature condition of the roots. There is thus danger of over-manuring root crops, and the desire to produce heavy crops not unfrequently leads practical men not to appreciate sufficiently this danger.

For the same reason Peruvian guano, sulphate of ammonia, nitrate of soda, and nitrogenous manures in general, should be applied to root-crops in moderation, especially on strong land.

On the other hand, superphosphate of lime and similar purely phosphatic manures have a tendency to induce early maturity, and to contribute in a great measure to the production of sound nutritious roots of good keeping qualities. Instead of growing swedes with very heavy dressings of dung, I believe it will be found, as a rule, more economical to apply to the land a moderate dressing of dung in the autumn, and to drill in the seed in spring with 3 to 4 cwts. of superphosphate on heavy land, or on light soils with a mixture of 3 cwts. of superphosphate and 2 cwts. of guano; or 3 cwts. of superphosphate, 1 cwt. of nitrate of soda, and 2 cwts. of salt.

If swedes have to be manured entirely with artificials, ammoniacal or nitrogenous manures may be used with advantage in larger proportions, in conjunction with superphosphate, than on land which has been previously dunged. In that case nitrogenous manures, such as guano or sulphate of ammonia, should be sown broadcast and not be drilled in with the seed, for all ammoniacal manures, contrary to the generally received opinion, have a tendency rather to check than to promote the growth of the plant in its early stages of development. For this reason it is desirable that such manures should be well distributed in a large body of soil, and not be placed in too close a proximity with the young turnip plants. On light sandy soils, potash salts in conjunction with phosphatic manures, and a moderate amount of ammonia or nitrogen in some form or other, have a beneficial effect both upon the yield per acre and the quality of the roots; whilst on soils containing a fair proportion of clay and loam, and soils in a fair agricultural condition, potash artificially supplied does not appear to increase the produce or to improve the quality of the roots.

Unlike superphosphate, salt retards maturity in root-crops, and may be usefully employed on free-growing light soils, upon which it is desirable to prolong the period of active growth. The effect of salt upon roots is to check premature ripening, and thus is the reverse of that of superphosphate.

The preceding remarks, on the special effects of various manuring elements upon root-crops, are not made with a view of giving practical directions as regards the most suitable manures for a crop of swedes, but merely for the purpose of pointing out how different is the influence of various manuring constituents upon roots, in either promoting or retarding their maturity, and generally in affecting their nutritive and keeping properties.

As regards the differences between sound well matured swedes and unripe less nutritious roots, I need hardly state that the latter are much poorer in sugar than the former. As pointed out already, roots of low feeding-quality are always richer in nitrogen than good feeding swedes. Unripe or imperfectly matured roots, as is well known, are apt to scour stock even if given in moderate proportions. The precise cause of this disagreement of immature roots with the health of stock has not yet been thoroughly investigated. It may be that unripe roots contain a poisonous principle which does not exist in fully matured roots, and the chemical nature of which has not yet been discovered. Unripe potatoes, we know, contain Solanine, an extremely poisonous substance which does not occur in ripe potatoes; and it is quite possible that a principle belonging to the same class of chemical compounds to which Solanine belongs may one day be discovered in unripe roots. Or perhaps the injurious effects of immature roots are connected with the presence of certain organic acids. As a matter of fact, we know that oxalic acid, a powerful vegetable poison, occurs in unripe roots in small proportions, and in larger quantities in the leaves of turnips, mangolds, sugar-beets, &c.; and it is therefore not at all unlikely that, in some degree, the scouring effects of unripe roots may be due to the presence of oxalic acid.

It is well known that roots which are quite immature do not keep for any length of time; and over-ripe roots also enter readily into decomposition when kept in heaps for a short period.

Swedes intended to be kept during the winter, therefore, should not be pulled up when they are still in an actively growing state, nor should the drawing of the crop from the land be delayed until the roots have become over-ripe. In both cases the roots, when put up into heaps, are sure to become rotten in a short time.

Probably the best period of pulling a crop of swedes and stacking the topped bulbs is when active growth has ceased, when the tops for the greater part have withered away, and when the bulbous roots have not yet arrived at full maturity. If the roots are intended to be kept until March or April, they should be pulled when rather under-ripe, but not too immature, topped and then clamped. Late-sown swedes, in mild winters, are better left growing in the field, for they may be moulded up to guard them against frost, or they may be pulled up and, without taking off the tops, thrown into an open shallow trench and loosely covered with soil. The question which naturally suggests itself is, Which is the best plan of preserving or increasing the nutritive qualities of roots?

At my request, my friend and former pupil, Mr. James W. Kimber, of Tubney Warren, Abingdon, Oxfordshire, some years ago kindly assisted me in carrying out some experiments for testing the keeping qualities of swedes, treated during winter in different ways.

EXPERIMENTS ON KEEPING SWEDES IN VARIOUS WAYS THROUGH WINTER.

The swedes on which the following experiments were tried, were planted late in June, and escaped the mildew which attacked the earlier sown crops. They were in a growing state up to the 19th of November, when a severe frost set in for a few days. Mild weather again ensued, and after allowing several days for the plants to recover themselves, Mr. Kimber sent me, on the 30th November, 6 average bulbs for analysis.

1. On the same day, two heaps of 6 cwts. each of swedes, topped and cleaned in the ordinary way, were covered with earth on the top of a light coating of straw.
2. Another quantity of swedes was pulled, and, with the tops left on, was thrown into a shallow trench and covered with earth.
3. A number of roots were moulded up as they stood in the field.
4. Another quantity was left standing untouched.

Mr. Kimber selected for trial a field of young swedes sown late in June, which escaped the mildew that attacked the early sown roots. They were not large, but apparently of good quality. The early planted swedes were attacked by mildew, and came to a stand in consequence; they probably were in their prime towards the end of September. Afterwards they made a fresh start and threw up new leaves; for which reason it was thought advisable to take a field of younger and smaller swedes in preference to a field of old and large ones for experiment.

Three of the roots sent to me by Mr. Kimber, on the 30th of November, weighed respectively—

	lbs.	ozs.
No. 1	2	5¾
No. 2	1	11
No. 3	1	11¼

They were submitted to analysis, and yielded the following average results:—

Composition of Swedes, November 30th.

Water	89·10
*Albuminous compounds	1·50
Sugar	3·87
Pectinous substances	·71
Crude fibre	4·37
Mineral matter (ash)	·45
	100·00
* Containing nitrogen	·241
Specific gravity of juice at 57° Fahr.	1·0358

The weather in December and January was very mild, and sprouts made their appearance on the crowns of the bulbs as early as the third week in January.

On the 22nd of February, some of the swedes which were kept in the field untouched, were sent to me for examination.

	lbs.	ozs	
Root No. 1 weighed	2	8¾	without tops.
„ No. 2 „	1	15¼	„
„ No. 3 „	1	8	„

The following is the average composition of the three roots—

Water	90·40
*Albuminous compounds	1·08
Sugar	3·88
Pectinous matters	·75
Crude fibre	3·44
Mineral matter (ash)	·45
	100·00
* Containing nitrogen	·173
Specific gravity of juice at 68° Fahr.	1·0318

On comparing the composition of the swedes drawn on the 30th of November, with that of the bulbs left standing untouched in the field until the 22nd of February, it will be seen that although the latter contained 1·3 per cent. more water than the November roots, the proportions of sugar and of albuminous matter were the same in both sets.

The roots left growing in the field, when they were pulled up on the 22nd of February, were perfectly sound.

The weather continued warm for the season, and on March 12th, one of the heaps of 6 cwts. of roots, put up on the 30th of November, was examined and weighed with the following results:—

	cwts.	lbs.
March 12.—Sound swedes	5	84
„ Rotten and useless swedes .	0	17
„ Sprouts	0	7
	5	108
Weight of roots on November 30	6	0
Loss	0	4

The sound roots were repitted. At the same time Mr. Kimber sent me for examination specimens from all the four experimental sets.

SET 1.—*Roots pitted in the usual way on the 30th of November, and analysed March 12th.*

An average analysis was made of 3 roots, weighing respectively 2 lbs. 15¾ ounces; 2 lbs. 5 ounces; 1 lb. 6¾ ounces.

The following was the composition of these roots on the 12th March.

Water	90·84
*Albuminous compounds	·99
Sugar	4·04
Pectinous compounds	·67
Crude fibre	3·01
Mineral matter (ash)	·45
	100·00
* Containing nitrogen	·159
Specific gravity of juice at 64° Fahr.	1·029

SET 2.—*Roots left growing in the field untouched until the 12th of March.*

For analysis an average sample was made of 3 roots, which with their tops weighed:—

	Bulbs.		Tops.
	lbs.	ozs	ozs
No. 1.	2	4¼	5½
No. 2.	1	14	6
No. 3.	1	8½	5¼

The bulbs and tops were analysed separately, with the following results:—

COMPOSITION of ROOTS and TOPS on the 12th of March.

	Roots	Tops.
Water	90·57	87 04
*Albuminous compounds .. .	·92	3·21
Sugar	4·02	
Pectinous compounds ..	·48	8·40
Crude fibre	3·53	
Mineral matter (ash)	·48	1·35
	100·00	100·00
* Containing nitrogen	·149	·514
Specific gravity of juice at 63° Fahr. ..	1·033	..

SET 3.—*Swedes moulded-up in November.*

The composition of an average sample of 3 roots on the 12th of March, was as follows:—

	Bulbs	Tops
Water	91·13	86·80
*Albuminous compounds	1·09	3·38
Sugar	3·55	
Pectinous compounds	·52	8·34
Crude fibre	3·27	
Mineral matter (ash)	·44	1·48
	100·00	100·00
* Containing nitrogen	·175	·542
Specific gravity of juice at 64° Fahr. ..	1·031	..

	Bulbs.		Tops.
	lbs.	ozs.	ozs.
No. 1 root weighed ..	2	3½	6¼
No. 2 " ..	2	3½	3
No. 3 " ..	2	0½	6¾

SET 4.—*Swedes thrown into a shallow trench with tops on, and covered with earth.*

One of the 3 roots sent to me on the 12th of March, weighed 1 lb. 12½ ounces, and the tops 4¾ ounces. This root and the tops were analysed separately.

The two other roots without tops, weighing respectively 2 lbs. 3 ounces, and 1 lb. 15½ ounces, were analysed together.

COMPOSITION of 3 ROOTS of SET 4 on the 12th of March.

	Root No 1		Average Sample of Bulb, Nos. 2 and 3
	Bulb	Tops	
Water	92·10	90·55	91·70
*Albuminous compounds	·77	2·56	1·04
Sugar	3·30	5·80	3·20
Pectinous compounds	65		·58
Crude fibre	2·72		3·01
Mineral matter (ash)	·46	1·09	·44
	100·00	100·00	100·00
* Containing nitrogen	·124	·411	·167
Specific gravity of juice at 62° Fahr.	1·024	..	1·027

It appears from these results, that the roots, which in November were thrown with the tops on in a shallow trench, had become deteriorated in quality by the time they were examined in March. They were also very watery, and poorer in sugar than in November.

With regard to the other sets, those pitted in the ordinary way appear to have kept best in quality.

All the roots which were kept in a growing state till the 12th of March had thrown out more or less tops, which appear to have been formed at the expense of the nutriment accumulated in the bulbs. The tops it will be seen contained less water than the bulbs, and were richer in nitrogenous or albuminous compounds.

In consequence of the exceeding mildness of the season, the swede tops soon began to run; and by the 25th of April those roots which were left standing in the ground had formed hard woody stems, 12 to 18 inches high. At this time specimens were again sent to me for analysis:—from the swedes which were left growing untouched in the field; from those which were covered with earth in a shallow trench without being topped and tailed; and lastly from the roots which were cleaned and clamped in the usual way.

The following results were obtained by the analyses of the various lots:—

	Swedes left standing in the Ground until 25th April. Average of 3 Roots.	Swedes placed in shallow Trench and covered with Earth. Average of 3 Roots.	Swedes cleaned and pitted in the usual way. Average of 2 Roots.
Water	90 47	93 13	90·90
*Albuminous compounds	·80	81	·77
Sugar	3·26	1·72	2 56
Pectinous compounds	·74	·48	·75
Crude fibre	4·14	3·37	4·46
Mineral matter (ash)	·59	·49	·56
	100·00	100·00	100·00
* Containing nitrogen	·128	·130	·124
Specific gravity of juice	1·0312	1 0194	1·0275
At	63½° Fahr.	64° Fahr.	62° Fahr.
Weight of roots without tops:—	lbs. ozs.	lbs. ozs.	lbs. ozs.
No. 1 root	2 13½	2 15	1 11
No. 2 „	2 2½	2 1	1 5½
No. 3 „	2 2	1 13¼	

As might have been expected, the roots which were kept in a growing state until the 25th of April, and which by that time had tops, hard stems and sprouts, sustained damage in feeding-qualities. The swedes which were placed in a shallow trench with the tops on and covered with earth, it will be seen were particularly watery and poor in sugar, and the roots which had been cleaned and tailed and clamped in the usual way had, by the 25th of April, also lost much of the sugar which they contained at an earlier period.

With regard to the loss in roots which had taken place in the several experimental lots when examined on the 25th of April, it was found that 12 per cent. of those left growing in the field untouched had rotted. The trenched lot had lost 5 per cent., and in the two heaps of cleaned and clamped swedes there were 80 per cent. of rotten or useless roots.

Both the heaps—the one which was put up on the 30th of November, and left undisturbed, and the other put up on the same day and moved and repitted on the 12th of March—shared the same fate. The roots in both heaps were covered in the usual way with straw and a good coating of earth, with a ventilator at the top, and probably would have kept far better had the season not been so mild. The roots appear to have been fully ripe in November; and in this state swedes, it appears from these experiments, cannot be kept in clamps without sustaining serious loss.

Strange to say, the swedes with the tops on, which were merely thrown together in a trench and covered with earth, kept sound to the end of the experiments, but, as will be seen by the preceding analyses, lost much in feeding-quality.

Although swedes, when they are pulled up towards the end of November, and without removing the tops are thrown in a shallow trench and lightly covered with earth, keep better than when they are topped and tailed and clamped in the usual way, it is not desirable, at any rate in a mild winter, to choose this plan and place them in trenches in preference to the usual way of storage in clamps in a cleaned state; for in a mild season they throw out tops which appear to be formed at the expense of the nutriment stored up in the bulbs.

With a view of obtaining a clear insight into the changes which swedes undergo when left in the soil for a long time in a growing state, I made a series of experiments some years ago; an account of which may here find an appropriate place.

Six swedes were planted on the 19th of March two feet apart from each other, their weight having been ascertained before planting.

	lbs.	ozs.
Root No. 1 weighed	3	7¾
No. 2 "	3	10
No. 3	2	13¼
No. 4	2	14¼
No. 5	2	7¾
No. 6	2	8¾

An average sample of swedes from the same field from which the preceding roots were taken was analysed on the 20th of March and found to have the following composition:—

Composition of Swedes on the 20th of March.

Water	90·10
*Albuminous compounds	1·67
Non-nitrogenous organic constituents	7·68
Mineral matter (ash)	·55
	100·00
* Containing nitrogen..	·26

The root No. 1 planted on the 19th of March, and then weighing 3 lbs. 7¾ ounces, was taken up from the land on the 14th of April, and weighed.

	lbs.	ozs.
The bulb weighed	3	1
The tops	0	5½

The bulb and tops were analysed on the same day with the following results :—

COMPOSITION of SWEDE on the 14th of April.

	Bulb.	Tops
Water	90·20	83·36
*Albuminous compounds	·94	4·38
Non-nitrogenous organic matters	8·23	11·25
Mineral matter (ash)	·63	1·01
	100 00	100·00
* Containing nitrogen	·15	·70

On comparing the composition of the swede on the 14th of April with the average composition of the roots before planting, it will be seen that a considerable proportion of the nitrogenous constituents of the root had passed into the tops.

Assuming that the root before planting contained 90 per cent. of water, ·6 per cent. of mineral matter, and ·25 per cent. of nitrogen, the bulb weighing 3 lbs. 7½ ounces, would have contained on the 19th of March :—

	Grains.
Dry organic matter	2272
Nitrogen in this	60
Mineral matter (ash)	145

On the 14th of April, I found :—

	In Bulb.	In Tops.
	Grains	Grains
Dry organic matter	1966	376
Nitrogen in this	32	17
Mineral matter (ash)	135	24
	Grains.	
Total dry organic matter in bulb and tops	2342	
„ nitrogen „ „	49	
„ mineral „ „	159	

During that period the root had consequently lost 306 grains of dry organic matter and 10 grains of mineral matter, and this loss of organic matter included 28 grains of nitrogen. The loss of 306 grains of organic matter, it will be seen, was transferred to the tops, which during the same period assimilated 70 grains additional dry organic matter from the atmosphere; and besides the transfer of the loss of mineral matter from the bulb, they took up 14 grains of mineral matter from the soil.

Whilst the bulb had thus lost an appreciable amount of dry organic matter, which passed into the tops, there was a slight gain of total organic matter in the whole plant (bulb and tops).

A fortnight later, that is, on the 29th of April, the second swede was removed from the land. Before planting on the 19th of March, it weighed 3 lbs. 10 ounces. Taken up about 6 weeks later, on the 29th of April, the bulb weighed 3 lbs. 8 ounces, and the tops 10 ounces. Bulb and tops were analysed on the 29th of April, with the following results:—

COMPOSITION of SWEDE on the 29th of April.

	Bulb.	Tops.
Water	90·15	85·70
*Albuminous compounds	1·25	3·44
Non-nitrogenous organic constituents ..	8·05	9·82
Mineral matter (ash)	·55	1·04
	100·00	100·00
* Containing nitrogen	·20	1·25

During the second period of growth, about double the weight of tops formed in the first period was produced at the expense of the food stored up in the bulb.

Assuming the bulb to have contained, before planting, 90 per cent. of water, ·6 per cent. of ash, and ·25 per cent. of nitrogen; the second bulb weighing, before planting, 3 lbs. 10 ounces, would have contained—

	Grains.
Dry organic matter	2385
Nitrogen in this	63·4
Mineral matter (ash)	152

On the 29th of April, I found:—

	In Bulb	In Tops
	Grains.	Grains.
Dry organic matter	2075	580
Nitrogen in this	44·6	24
Mineral matter (ash)	123	45·5
	Grains.	
Total dry organic matter in bulb and tops	2655	
nitrogen " "	68·6	
mineral matter	168·5	

In the course of 6 weeks, the bulb, it will be seen, lost 310 grains of dry organic matter, and with it, 18·8 grains of nitrogen, and 29 grains of mineral matter, which accumulated in the tops together with some organic matter taken from the atmosphere, and some mineral matter drawn from the soil.

The third swede, planted on the 19th of March, and weighing at that time 2 lbs. 1¾ ounce, was pulled up on the 15th of May, and analysed the same day. At that time the bulb, weighing 2 lbs. 1¼ ounce, and the tops 10½ ounces, had the following composition:—

COMPOSITION of SWEDE on the 15th of May.

	Bulb.	Tops.
Water	89·85	82·60
*Albuminous compounds	1·69	4·15
Non-nitrogenous organic constituents ..	7·78	11·60
Mineral matter (ash)	·68	1·65
	100·00	100 00
* Containing nitrogen	·27	·66

On the same assumption as before, the third swede would have contained before planting:—

	Grains.
Dry organic matter	1861
Nitrogen in this	49·5
Mineral matter (ash)	119

On the 15th of May was found:—

	In Bulb	In Tops
	Grains	Grains.
Dry organic matter	1370	723
Nitrogen in this	39	30·3
Mineral matter (ash)	98	76
	Grains.	
Total dry organic matter in bulb and tops	2093	
„ nitrogen „ „	69·3	
„ mineral matter „ „	174	

In the third period, the swede had thus lost 491 grains of dry organic matter; or about one-fourth of the total amount of dry organic matter found in the root on the 19th of March, had by the 15th of May migrated into the tops, which during the same time assimilated 232 grains of organic matter from the constituents of the atmosphere, and drew 55 grains of additional mineral matter from the soil in which the root was planted.

The fourth experimental swede was pulled up on the 28th of May. Before planting on the 19th of March, it weighed 2 lbs. 14¼ ounces. When taken up on the 28th of May, the bulb weighed 2 lbs. 11 ounces, and the tops 9¼ ounces.

The composition of the bulb and tops on the 28th of May, was as follows:—

COMPOSITION of SWEDE on the 28th of May.

	Bulb.	Tops.
Water	94·00	80·20
*Albuminous compounds	·75	2·81
Non-nitrogenous organic compounds ..	4·58	15·40
Mineral matter (ash)	·67	1·59
	120·00	100·00
* Containing nitrogen	·12	·45

Before planting, the swede is assumed to contain:—

	Grains.
Dry organic matter	1901
Nitrogen in this	50·5
Mineral matter (ash)	122

When removed from the soil on the 28th of May, I found:—

	In Bulb	In Tops
	Grains	Grains
Dry organic matter	1003	737
Nitrogen in this	22·5	18·2
Mineral matter (ash) . . .. .. ·..	126	64
	Grains.	
Total dry organic matter in bulb and tops	1740	
„ nitrogen „ „	40·7	
„ mineral matter „ „	190	

In the fourth period of growth, the root lost 898 grains of dry organic matter, and in it 28 grains of nitrogen, which passed into the tops.

It will be noticed that at the termination of the fourth period the bulb was very watery, whilst the tops contained nearly 20 per cent. of dry matter and only 80 per cent. of water.

The fifth swede was allowed to grow until the 4th of July, when it was taken up, weighed, and analysed.

Before planting on the 19th of March, the bulb weighed

2 lbs. 7¾ ounces. On the 4th of July, the bulb weighed 2 lbs. 2¼ ounces, and the tops 1 lb. 4¼ ounces.

Composition of the Swede on the 4th of July.

	Bulb	Tops.
Water	91·75	74·25
*Albuminous compounds	1·00	3·56
Non-nitrogenous organic constituents	6·44	19·48
Mineral matter (ash)	·86	2·71
	100 00	100·00
* Containing nitrogen	·16	·57

During this stage of growth, it will be noticed, the tops increased much in weight, and became dryer than during the fourth period of growth, whilst the root was more watery than at the time of planting.

Before planting on the 19th of March, the bulb may be assumed to have contained:—

	Grains.
Dry organic matter	1635
Nitrogen in this	43·5
Mineral matter (ash)	104

When taken up on the 4th of July, I found:—

	In Bulb	In Tops
	Grains.	Grains.
Dry organic matter	1123	2041
Nitrogen in this	24	50·5
Mineral matter (ash)	122	240

	Grains
Total dry organic matter in bulb and tops	3164
,, nitrogen ,, ,,	74 5
,, mineral matter ,, ,,	362

During the period of growth, the root lost 512 grains of dry organic matter, and in it 19·5 grains of nitrogen, whilst the assimilation of organic food from the atmosphere and the bulb, and of mineral matter drawn from the soil during this period, was very great.

Altogether, the fifth swede, weighing before planting 2 lbs. 7¾ ounces, and containing 1635 grains of organic, and 104 grains mineral matter, gained 1529 grains of organic matter, and 258 grains of mineral matter; or, in other words, the amount of solid matter in the bulb and tops, in round numbers, was twice as large on the 4th of July, as in the root before planting. The loss in solid substance in the root, however, was great, and the gain in substance in the tops was partly due to the migration of organic food from the bulb to the tops, and the assimilation of atmospheric food and mineral matter drawn from the soil.

The last or sixth swede was removed from the land on the 2nd of August, and weighed and analysed the same day.

Before planting it weighed 2 lbs. 8¾ ounces.

Taken up on the 2nd of August, the bulb weighed 1 lb. 5¼ ounces, and the tops 5 ounces.

COMPOSITION of the SWEDE on the 2nd of August.

	Bulb.	Tops.
Water	91 40	58·43
*Albuminous compounds	1·75	4·12
Non-nitrogenous organic constituents ..	5·49	32·80
Mineral matter (ash)	1·36	4·65
	100·00	100·00
* Containing nitrogen	·28	·66

The bulb, as in the preceding period of growth, was watery, but the tops were very dry; in the interval between the 4th of July and the 2nd of August, no doubt a large proportion of the tender leaves and branches dropped off, and were lost, and hence, the preceding results do not give a fair representation of the total amount of organic and mineral matter which had accumulated in the whole plant from the 19th of March till the 2nd of August.

Before planting, the swede may be assumed to have contained:—

	Grains.
Dry organic matter	1676
Nitrogen in this	44
Mineral matter	107

On the 2nd of August I found:—

	In Bulb	In Tops
	Grains	Grains.
Dry organic matter	688	982
Nitrogen in this	26 5	14·5
Mineral matter (ash)	130	102
	Grains.	
Total dry organic matter in bulb and tops	1670	
„ nitrogen „ „	41	
„ mineral matter „ „	232	

TABLE III.—COMPOSITION OF RED RIND SWEDES GROWN ON THE SAME LAND.

	SET No. 1.—Pulled up September 30. Analysed October 2.			SET No 2.—Pulled up October 23 (from same part of Field as those drawn (September 30). Analysed October 28.			SET No. 3.—Received December 18. (The Swedes were stored October 12)			SET No. 4.—Received March 30.		
	Root 1.	**Root 2.**	**Root 3.**	**Root 4.**	**Root 5.**	**Root 6.**	**Root 7.** Taken from outside of Heap.	**Root 8.** From middle of Heap 3 feet high.	**Root 9.** From place against Wall.	**Root 10.**	**Root 11.**	**Root 12.**
Water	88·190	88·910	90·190	89·860	89·010	90·440	86·320	89·740	91·120	87·370	89·350	89·100
Soluble matters	8·064	7·831	6·375	6·962	7·684	5·718	9·192	7·574	5·824	8·699	6·832	7·047
Insoluble substances (crude fibre) ..	3·746	3·259	3·435	3 178	3·306	3·842	4·488	2·686	3·056	3·931	3·818	3·853
	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000
Percentage of ash	·651	·522	·605	·554	·762	·787	·808	·707	·791	·471	·607	·704
„ organic matter	9·205	10·568	9·205	9·586	10·228	8·773	12·872	9·553	8·089	12·159	10·043	10·196
„ dry substance	9·856	11·090	9·810	10·140	10·990	9·560	13·680	10·260	8·880	12·630	10·650	10·900
Water	88 190	88·910	90·190	89·860	89·010	90·440	86·320	89·740	91·120	87·370	89·350	89·100
*{Soluble albuminous compounds	1·062	1·069	·868	1·061	1·264	1·099	·737	·554	·350	·944	·833	·761
{Insoluble „ „ .	·199	·156	·192	·170	·211	·207	·350	·152	·175	·137	·135	·132
Sugar, gum, pectin	6·474	6·365	5·021	4·460	5·782	3·969	7·824	6·443	4·819	7·332	5·574	5·755
Starch and digestible fibre	2·256	1·906	1·993	2·877	1·827	2·386	2·202	1·585	1·536	2·079	2·344	1·799
Pure cellular fibre	1·168	1·072	1·134	1·018	1·144	1·113	1·759	·819	1·209	1·667	1·157	1·749
Soluble salts	·528	·417	·486	·441	·638	·650	·631	·577	·655	·292	·425	·531
Insoluble salts	·123	·105	·116	·113	·124	·136	·177	·130	136	·179	·182	·173
	100·000	100·000	100·000	100 000	100·000	100·000	100·000	100·000	100·000	100·000	100·000	100·000
* Containing nitrogen	·202	·196	·169	·197	·236	·209	·174	·113	·084	·173	·155	·143
Equal to protein compounds	1·261	1·225	1·060	1·231	1·475	1·306	1·087	·706	·525	1·081	·968	·893
Weight of root..	lbs ozs. grs. 3 15 159	lbs. ozs. grs. 5 3 384	lbs. ozs. grs 4 15 402½	lbs. ozs. grs. Oct. 28. 5 4 260	lbs. ozs. 7 3¼	lbs. ozs. 5 5	lbs. ozs. grs. 2 1 362	lbs. ozs. grs. 3 1 193	lbs. ozs. grs. 3 10 110	lbs. grs. 5 550	lbs. ozs. grs. 6 5 185	lbs. ozs. grs. 4 13 263
Specific gravity of root	1·017	1·014	..	..	..	..	..	..	..	..	..	..
Specific gravity of juice	1·035	1·036	1·032	1·030	1·033	1·032	1·040	1·028	1 027	1·040	1·037	1·037

The bulb, when removed from the land on the 2nd of August, had thus lost 988 grains of organic matter, or, in other words, nearly two-thirds of the solid substance of the bulb had been transferred to the tops.

The preceding experiments show clearly that during the second stage of development of swedes, the tops are formed at the expense of the food accumulated in the bulbs during the first stage; and that, in consequence, swedes lose in substance and feeding quality when they are allowed to make a second growth of tops after they have arrived at maturity. At the same time, it will be noticed that swedes planted for seed exhaust the land of much readily available mineral matter, and probably also of nitrogen.

A good many years ago, I endeavoured to find out to what extent swedes grown on the same field varied in composition at different times of the year after they had reached maturity, and to trace, if possible, any changes which such roots may be supposed to undergo on keeping.

I found, however, that individual roots from the same field varied so much in composition that no practical deductions could be legitimately drawn from the results of the analyses. But as we do not possess many recorded analyses of Swedish turnips, I have given the analyses in Table III. as illustrations of the variable composition of swedes grown on the same field.

Laboratory, 11, *Salisbury Square*,
London, *Jan.* 1877.

V.—*The Advantages offered by Cavendish College, Cambridge, as bearing on the Education of Agriculturists.* By the Rev. Canon BRERETON, M.A., &c.

A NEW Institution is being established in Cambridge, which, while very comprehensive in its object, may be specially beneficial to the agricultural class. The advantages of a University education have hitherto been thought unsuitable to, or out of the reach of, English farmers. The time and the cost of a three-years' residence in College, after the school course is finished, have been considered incompatible with the obligations, both of learning and earning, in the business of a farm. But the great improvement effected in the last twenty years by the establishment of the University Local Examinations, the reform of many of the Grammar Schools, and the successful introduction through County Associations of economical and effective modern Public Schools, has not only made the general school preparation itself much more effective for after-life, but has admitted the possibility of adding to the school the further advantage of a College course, and this within the University, and in permanent connection, therefore, with the highest education of the country. In short, many a lad of fifteen or sixteen who has been taught in a good school has it quite in his reach to take a University degree at eighteen or nineteen, and then enter on his professional studies and duties with all the advantages of a completed course of general education. To secure practically this important result, and to offer to such lads the best University instruction, with suitable protection and associates, and at a very moderate cost, the new Cavendish College is now being founded in Cambridge. An association has been formed, similar to those which have established the County Schools, which has been registered as "The County College Association, Limited." The Duke of Devonshire, Chancellor of the University, is the President of the Association, and has allowed the new College to be called after his family name. A very influential body of trustees, directors and shareholders is being formed, in which leading University men are co-operating actively with some of the leaders of the agricultural and commercial classes. A special feature of the College is to be the preparation of trained masters for the middle and higher schools. If this is effectively done, one of the most urgent needs of the country will be supplied without any unnecessary extension of Government education, and a lasting union will have been effected between the Universities of England and the people generally. I sincerely hope that His Grace the Duke of Devonshire, and those he is encouraging to persevere in this interesting and important undertaking, will find that they are supported by those who will derive most substantial benefit from the new step thus offered them in the ladder of learning. To a farmer's family, access to higher education must be the greatest boon, not only because the art of agriculture itself urgently demands higher qualifications in those who follow it, but also, because all other honourable callings in life are more and more expecting a higher standard of education in all who can reasonably hope to prosper. Cavendish College, in appealing to the counties of England for support, is offering itself, not exclusively, but specially to rural and agricultural families. The share capital (30,000*l.*) is being raised on the expectation of a dividend, which is not to exceed 5 per cent.; and care has been taken to provide that this introduction of the commercial principle shall invigorate only, but not pervert, through greed of profit, the permanent and public object of its founders and benefactors.

It should be remembered that degrees in the University are no longer obtained exclusively by classical and mathematical studies, but that, practically, all the branches of knowledge that have been sufficiently investigated to be capable of scientific teaching are equally taught, tested, and honoured in the University course; as for instance, a Law and History Tripos, and a Natural Science Tripos, as well as the old Mathematical and Classical Triposes. So far, then, from a University degree being desirable only for a few learned professions, or as a badge of general culture, it is strictly true that those who wish to be best prepared for the pursuit of the useful arts, among which Agriculture will always take the lead, may find in the Universities the best preparations, only greatly enhanced in value by admission to full membership in all the most honourable societies in the country, the especial community of scholars and gentlemen.

Extract from the Introduction to the Report of the Proceedings at the Laying of the Foundation Stone of the College Lecture Hall, by His Grace the Duke of Devonshire, K.G.

CAVENDISH COLLEGE, Cambridge, has been founded by the County College Association, a limited liability company, empowered to raise a capital of 30,000*l.* in 3000 shares of 10*l.* each, the dividends being limited to a maximum of 5 per cent. The objects of the College are: 1. To enable students somewhat younger than ordinary Undergraduates to pass through a University course and obtain a University degree. 2. To train in the art of teaching those students who intend to become Schoolmasters. 3. To offer to parents and students generally the advantages of a wise economy. The College is situated in its own grounds, about half a mile out of the town of Cambridge, on the Hills Road. When complete it will contain accommodation for 300 students with a corresponding staff of Tutors. The first block of buildings, designed for the reception of sixty students, will be ready for occupation at the beginning of January, 1877. Each student has a furnished room of his own, to serve at once for bedroom and study. For social intercourse and recreation a sufficient number of common-rooms has been provided. All meals are taken in common. The College Terms are four, viz.:—1. From early in October to the middle of December. 2. From early in January to a few days before Easter. 3. From shortly after Easter to the middle of June. 4. From the beginning of July to the end of August. The first three correspond with the three University terms, the only difference being that at Cavendish College tuition will be continued for ten weeks in each term instead of the usual eight. The fourth is not a University term; but it is the portion of the Long Vacation during which the best students among the Undergraduates reside in Cambridge, and study under private tutors. At Cavendish College the regular teaching staff will be in residence, and the work of tuition will go on as in the other terms. The College charge is 84*l.* per annum, payable quarterly at the end of each College term. This charge includes use of furniture, board, lodging, washing, University dues,* and Tuition of all kinds. The College staff will be sufficiently large to supply almost all the instruction needed, and in cases where it is necessary to send the students outside for tuition, the expense will be borne by the College and not charged to the parents. The number of Tutors will of course be increased as the students increase in number. The usual age for admission into the College will probably be about sixteen or seventeen; but no maximum or minimum limit has been fixed. It seems likely that a considerable number of students will enter at the ordinary age, and several between fifteen and sixteen. It is expected that a great majority of the students will become members of the University. Since the College has no Charter of Incorporation, in order to do so they must matriculate formally as Non-Collegiate Students, though practically they will be members of a fully organized College. Students who do not intend to join the University will be freely admitted, and will, within the College, be in all respects on the same footing as the others. It will be assumed that every student who is a member of the University will leave the College as soon as he has taken his degree; but permission to remain longer will be given under certain circumstances. If such permission is desired, it should be applied for as long as possible beforehand. A term's notice or a term's payment will be required whenever a non-University student wishes to leave the College; and the same rule will be enforced in the case of University students who leave before they take their degrees. Applications for admission into the College should be made to the Warden. All candidates accepted by him are required—1. To produce a certificate of good character signed by some person of position, if possible a graduate of Oxford or Cambridge. 2. To pass an easy entrance examination. The examinations are held a day or two before the commenoement of each term. Two papers are set—one in elementary Classics, consisting chiefly of questions in Latin and Greek Grammar, and the other in rudiments of Arithmetic, Euclid, and Algebra. Those who have recently passed the Local Examinations of either Oxford or Cambridge are excused the College entrance examination. For those students who wish to obtain a degree the best time to enter is at the beginning of October, or the beginning of January, the former being slightly the more convenient. Those who wish to be members of the College without being members of the University can be received at the beginning of any of the College terms; and it will sometimes be advisable for a student to enter thus a term or two, or even a longer period, before he desires to join the University. A registration fee of 1*l.* will charged in cases where it is required that the name of a candidate for admission into the College should be placed upon the College books before the term immediately preceding that in which he wishes to enter. Every morning and evening the students are assembled in one of the rooms of the College to join in a short form of prayer. The regular religious services are those of the Church of England, but the fullest liberty of conscience is freely given to Nonconformists.

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* N.B.—The fees for the various University Examinations will be paid by the College *once.* If a student fails in an Examination, the fees for any further attempts must be paid by his parents.

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The Promoters of the College are endeavouring to extend by means of a double economy—of time and of money—the benefits of University education to many who have hitherto been deprived of them: but they do not desire their College to be a class institution, or a place where mere boys can obtain degrees. It cannot be supposed that out of all who desire a University education but one class finds it necessary to begin the active work of life at twenty years of age, and that this is the only class to which economy is an object: nor can an attempt to build and organize a College specially adapted for students who wish to enter the University at sixteen or seventeen, and get a degree at nineteen or twenty, be fairly described as a design for lowering the value of a Cambridge degree by conferring it indiscriminately on a mob of raw boys. No one will be admitted to the College whose attainments are not almost on a level with the standard required by the University in the Previous Examination, and no member of the College can obtain a degree until he has fulfilled all the usual conditions of scholarship and residence. Nor will the College students form a class by themselves apart from the body of their fellow-Undergraduates. Experience has already shown that many young men of the ordinary age may be expected to enter the College; and the junior students will, long before they take their degrees, be equal in point of age to the mass of the members of the other Colleges. It may safely be assumed, therefore, that difference in years will not prove a barrier to free intercourse; and the same may be asserted with equal confidence of difference in discipline.

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T. J. LAWRENCE, *Warden.*

VI.—*Extracts from Copy of "a Report made to the Board of Inland Revenue by the Principal of the Chemical Laboratory, Somerset House, on Experiments conducted by him for the Analysis of Butter."* By J. BELL.

[RETURN to an Order of the Honourable the House of Commons, dated 15th June, 1876.]

ONE of the methods most recently suggested to analyse butter was to estimate the amount of fixed fatty acids which a butter would yield. This test, which was devised by Messrs. Angell and Hehner, and which is based upon the fact that genuine butter contains a less amount of these fixed acids than other animal or vegetable fats, was the nearest approach to the solution of the question which had been made. But their standard of purity, which was founded upon the analyses of a few samples obtained from one part of the country and about one time of the year, was looked upon with suspicion, and met with but little acceptance from analysts, so that the test for some time practically fell into abeyance.

It was found, however, that although the test was sound in principle, it involved a somewhat difficult chemical process in its application, and required a considerable amount of manipulative skill to carry it out. We therefore directed our attention to the devising of a more simple and more easily applied test, and in this, I think, we have succeeded.

This method consists in the determination of the specific gravity of the butter fat in the liquid condition at 100° Fahr. We are not aware that this method had ever before been applied in the analysis of butter. It is true that there had been an endeavour to determine the specific gravity of some of the constituents of butter fat when in the solid condition, but no useful result had been arrived at; in fact, the results were rather misleading than otherwise.

In applying the specific gravity test to butter, the curd, salt, and water are first removed, and the density of the melted fat at 100° Fahr. is taken in an ordinary specific-gravity bottle. The bottle used for the purpose was of a pear shape, into which could be inserted the bulb of a sensitive thermometer, the mercurial portion of which extended nearly the whole depth of the bottle. The temperature of 100° Fahr. was adopted, as at that temperature nearly all the animal and vegetable fats likely to be used as butter adulterants assume the liquid state.

It will be seen from Table I. that the specific gravity of ordinary animal fats varies from 902·83 to 904·56, while the specific gravity of butter fat, as exhibited in Table II. (p. 184 *et seq.*), rarely falls below 910·, the usual range being from about 911· to 913·. There is thus a material difference between the specific gravity of butter fat and that of ordinary commercial animal fats, and it is obvious that this difference affords a satisfactory basis upon which to found an additional test for determining the purity of butter.

TABLE I. RESULTS of ANALYSES of ANIMAL FATS.

Description of Sample	Specific Gravity at 100° Fahr	Percentage of fixed Fatty Acids
Mutton Suet	902·83	95·86
Beef Suet	903·72	95·91
Fine Lard	903·84	96·20
Dripping (Commercial)	904·56	94·67
Mutton Dripping (Genuine)	903·97	95·48

It may be useful to describe here briefly the difference between the composition of ordinary animal fats and that of butter fat. The former consist of a mixture of stearic, palmitic, and oleic acids, in combination with glycerine, and as these acids are insoluble in water, and not readily volatilized, they are commonly called "fixed" fatty acids, in contradistinction to other fatty acids which are either volatile or soluble in water, such as butyric, caproic, caprylic, &c., acids. Butter fat also consists of fatty acids in combination with glycerine, but while by far the larger proportion of the acids are of a "fixed" nature, there are invariably present several of those which are volatile or soluble in water, and it is to the latter, the most important of which is butyric acid, that the characteristic taste and smell of butter are chiefly due. In rich butters the proportion of the volatile acids is comparatively large, the specific gravity of the fat is high, and the percentage of "fixed" fatty acids is correspondingly low.

In getting samples of butter we purposely selected a wide range, so as to obtain as far as possible fair representative specimens of the different variations that occur in the composition of genuine butters produced under different conditions. In short, the samples may be taken to fairly represent the various qualities of butter as made and brought to market by farmers both in England and Ireland.

The whole of the samples in Table II. have been tested by the specific-gravity method, and it will be seen from the results that while a few samples were very poor in quality, and a few others exceptionally rich, the great bulk examined were found to possess considerable uniformity of composition, the principal variations being apparently due to a difference in the method of manufacture, the different seasons of the year when made, and the various modes of feeding. As might be expected, some of the poorest butters were produced by, and obtained from, small farmers in Ireland, at a time when there was very little grass and food was scarce.

When the fixed fatty acids test referred to is accurately performed, the correspondence between the amount of these acids and the specific gravity of the fat is so close that it is possible to predicate within a few tenths one result from the determination of the other. Owing to the pressure of other duties, the proportion of fixed fatty acids in each sample was not ascertained; but a sufficient number of determinations have been made to establish the fact of this correspondence, as will be seen in Table II. in the column headed "Percentage of fixed Fatty Acids." A little variation may sometimes arise from the fact that the several fixed fatty acids are not always present in different butters in exactly the same proportion.

A noticeable feature in the results recorded in Table II. is the great variation in the quantity of water in the different butters, the lowest being 4·15 per cent. and the highest 20·75 per cent. The Devon and Dorset butters, which usually stand so high in the market, were found to contain in nearly all cases a high percentage of water, and No. 15, which was procured from the dairy of a private gentleman, contained as much as 16·99 per cent., and a second sample, recently obtained from the same source, contained 15·70 per cent.

There is another point of interest which we have in some measure elucidated, and which has reference to the deterioration which certain butters undergo when kept in small quantities in

TABLE II.—RESULTS of the ANALYSIS of 117 SAMPLES of BUTTER.

No.	Date.	Whence Obtained.	Percentage of				Butter Fat.		
			Water.	Salt.	Curd.	Butter Fat.	Specific Gravity at 100° Fahr.	Melting Point, Fahr.	Percentage of fixed Fatty Acids.
1	July 1875	Surrey	4·15	..	..	..	913·49	86·°	..
2	,, ,,	,,	6·80	3·27	·80	89·13	913·09	88·	..
3	,, ,,	,,	15·50	2·10	1·70	80·70	913·09	88·	..
4	,, ,,	,,	11·40	·76	·77	87·07	912·28	90·	..
5	,, ,,	,,	7·55	1·03	1·15	90·27	913·89	85·	..
6	,, ,,	,,	12·70	·80	·86	85·64	912·79	86·	..
7	,, ,,	Irish salt butter	11·67	2·20	·86	85·27	912·28	87·5	87·20
8	Sept. ,,	County Galway	11·79	3·39	·68	84·14	913·09	88·3	..
9	,, ,,	,, ,,	14·04	1·63	1·51	82·82	911·58	88·3	..
10	,, ,,	,, ,,	10·12	2 62	·70	86·56	912·99	88·2	..
11	,, ,,	,, ,,	4·91	1·54	·43	93·12	912·08	89·	87·42
12	,, ,,	,, ,,	11 73	2·11	·47	85·69	912·99	89·	..
13	,, ,,	,, ,,	11·83	1 14	·80	86·23	912·69	89·	86·60
14	,, ,,	Devonshire	13 22	1·34	·68	84·76	912·69	87·8	..
15	,, ,,	Cornwall	16·99	2·65	1·36	79·00	912·39	88·7	..
16	,, ,,	Cumberland	12·26	4·52	·94	82·28	912·89	87·5	..
17	,, ,,	,,	11·92	4·22	1·52	82·34	912·39	87·5	..
18	,, ,,	,,	12·96	3 80	·36	82·88	912·99	88·	..
19	,, ,,	,,	9 72	2·82	·28	87·18	911·98	88·	..
20	,, ,,	,,	8·18	3·14	·92	87·76	912·69	87·	..
21	,, ,,	,,	12·84	2·78	·98	83·40	912·69	87·5	..
22	,, ,,	Dorsetshire	16 85	2·77	·11	80·27	911·88	87 8	..
23	,, ,,	,,	16·37	3·22	·56	79·85	911·88	87·5	..
24	,, ,,	,,	17·06	2·13	·88	79·93	911·98	87·3	..
25	,, ,,	,,	17·03	2·25	·86	79·86	912·28	87·8	..
26	,, ,,	,,	18·37	1·63	·39	79·61	912·08	87·3	..
27	,, ,,	,,	13·24	1·25	·40	85·11	912·18	87·5	..

28	Oct.	,,	Cumberland	12·22	·61	·34	86·83	911·38	89·2	..
29	,,	,,	,, ...	13·02	·72	·61	85·65	911·28	90·2	..
30	,,	,,	,, ...	11·74	1·32	·42	86·52	911·68	90·	..
31	,,	,,	,, ...	8·72	·58	·70	90·00	912·18	88·5	..
32	,,	,,	,, ...	9·55	4·17	·24	86·04	911·98	88·7	..
33	Nov	,,	Suffolk	14·41	3·10	·64	81·85	912·39	89·	86·87
34	,,	,,	,, ...	20·75	3·82	·61	74·82	911·58	92·	87·80
35	,,	,,	,, ...	14·26	3·82	·22	81·70	912·89	88·5	86·45
36	,,	,,	,, ...	9·11	8·28	·40	82·21	912·79	88·5	86·00
37	,,	,,	,, ...	11·52	3·92	·41	84·15	913·89	87·5	85·50
38	,	,,	,, ...	9·60	6·45	·82	83·13	912·28	89·	..
39	,,	,,	Devonshire	14·36	2·66	1·46	81·52	912·99	88·5	..
40	,,	,,	,, ...	15·52	4·08	1·54	78·86	911·78	89·	87·40
41	,,	,,	,, ...	17·56	2·98	1·14	78·32	912·39	89·	..
42	,,	,,	,, ...	17·18	3·00	1·24	78·58	912·99	88·5	..
43	,,	,,	,, ...	16·28	3·32	1·56	78·84	912·79	88·5	..
44	.,	,,	,, ...	18·72	2·24	1·36	77·68	912·39	89·	..
45	,,	.,	,, ...	16·42	2·80	1·60	79·18	912·23	88·	86·87
46	,,	,,	,, ...	13·62	3·00	·60	82·78	910·78	90·	88·00
47	,,	,,	Suffolk	13·14	5·74	2·96	78·16	913·97	88·	..
48	Dec.	,,	County Londonderry	19·40	3·70	·56	76·34	912·96	89·	..
49	,,	,,	,, ,, ...	13·70	2·30	1·86	82·14	912·28	90·	..
50	,,	,,	,, ,, ...	15·94	2·40	2·68	78·98	911·06	91·5	..
51	,,	,,	,, ,, ...	18·52	4·84	2·16	74·48	911·91	90·5	..
52	,,	,,	,, ,, ...	14·90	6·04	1·50	77·56	911·88	90·5	..
53	,,	,,	,, ,, ...	14·98	3·74	1·14	80·14	910·97	91·5	..
54	Jan.	1876	Kent	11·71	3·04	·76	84·49	913·14	88·5	..
55	,,	,,	,, ...	13·51	2·90	·70	82·89	913·09	88·5	..
56	,,	,,	,, ...	18·64	2·68	·79	77·89	910·50	93·	88·60
57	,,	,,	,, ...	17·60	2·60	·98	78·82	910·63	93·	..
58	,,	,,	Surrey	13·55	2·49	·80	83·16	910·93	92·	88·35
59	,,	,,	,, ...	14·60	..	..	..	912·23	89·	..
60	,,	,,	County Cork	13·63	·44	·62	85·31	911·06	89·5	87·72
61	,,	,,	,, ,, ...	16·46	1·13	1·12	81·29	910·19	92·5	88·75

TABLE II.—RESULTS of the ANALYSIS of 117 SAMPLES of BUTTER—*continued.*

No.	Date.		Whence Obtained.	Percentage of				Butter Fat.		
				Water.	Salt.	Curd.	Butter Fat	Specific Gravity at 100° Fahr	Melting Point, Fahr.	Percentage of fixed Fatty Acids.
62	Jan.	1876	County Cork	13·57	·65	·84	84·94	911·40	89°·	87·50
63	,,	,,	,, ,, ...	14·98	·68	·68	83·66	909·87	92·5	89·15
64	,,	,,	,, ,, ...	15·34	·40	·69	83·57	910·62	91·	..
65	,,	,,	,, ,, ...	14·64	·46	·82	84·08	910·41	91·5	..
66	Feb.	,,	Carnarvonshire	11·41	3·03	·70	84·86	912·39	92·	87·01
67	,,	,,	,, ...	10·43	2·46	·57	86·54	911·48	89·	..
68	,,	,,	,, ...	13·79	2·96	1·26	81·99	910·62	93·	88·32
69	,,	,,	,, ...	11·05	7·71	·44	80·80	910·73	93·	..
70	,,	,,	,, ...	11·36	4·97	1·04	82·63	911·06	93·	88·42
71	,,	,,	,, ...	16·24	9·20	·40	74·16	911·34	93·	88·12
72	,,	,,	Normandy	11·71	3·60	·95	83·74	911·45	90·	..
73	Mar.	,,	Irish salt butter	16·89	8·56	1·23	73·32	911·48	89·5	..
74	,,	,,	Wiltshire	11·59	1·49	·44	86·48	912·01	90·5	86·96
75	,,	,,	,, ...	13·21	1·74	·56	84·49	911·79	90·5	..
76	,,	,,	,, ...	12·52	2·12	·79	84·57	911·46	90·5	87·35
77	,,	,,	,, ...	11·99	2·23	·99	84·79	911·82	89·	..
78	,,	,,	,, ...	12·57	1·58	·89	84·96	911·48	90·5	87·65
79	,,	,,	Cumberland	11·81	8·38	3·06	76·75	912 51	89·	86·90
80	,,	,,	,, ...	12·08	2·39	3·74	81·79	911·60	92·	87·74
81	,,	,,	,, ...	12·89	3·69	3·15	80·27	912·08	90·	86·92
82	,,	,,	,, ...	13·08	2·33	2·72	81·87	910·60	92·	88 29
83	,,	,,	,, ...	11·18	1·79	5·32	81·71	911·74	91·5	87·60
84	,,	,,	,, ...	19·12	3·93	4·02	72·93	910·94	92·5	88·40
85	,,	,,	County Monaghan	13·39	6·68	1·62	78·31	910·42	92·5	..

86	,,	,,	,, ,,	15·60	6·51	·54	77·35	910·14	92·0	·90
87	,,	,,	,, ,,	13·59	15·08	1·36	69·97	909·47	93·5	.
88	,,	,,	,, ,,	13·50	2·58	·55	83·37	911·04	91·5	.
89	,,	,,	,, ,,	14·55	5·86	1·31	78·28	910·30	93·	.
90	,,	,,	,, ,,	12·43	3·55	·55	83·47	910·70	92·	.
91	,,	,,	County Londonderry	11·81	2·85	·70	84·64	910·85	92·	·62
92	,,	,,	,, ,,	13·88	3·15	·75	82·22	911·47	90·	·66
93	,,	,,	,, ,,	14·34	3·31	·78	81·57	911·88	90·5	.
94	,,	,,	,, ,,	12·57	4·32	·51	82·60	910·65	92·	·74
95	,,	,,	,, ,,	13·56	2·29	·75	83·40	912·03	90·5	·42
96	,,	,,	,, ,,	11·56	2·82	·47	85·15	911·79	90·5	·05
97	,,	,,	Dorsetshire	13·92	2·13	·52	83·43	910·58	94·	·65
98	,,	,,	,,	8·88	4·50	·50	86·12	910·85	92·5	88·46
99	,,	,,	,,	12·55	2·22	1·35	83·88	912·20	91·5	..
100	,,	,,	,,	12·81	1·78	·74	84·67	910·80	92·5	88·17
101	,,	,,	Staffordshire	10·61	1·11	·63	87·65	910·94	91·5	88·21
102	,,	,,	,,	12·87	1·56	·76	84·81	912·44	89·5	87·14
103	,,	,,	,,	12·84	1·67	·56	84·93	911·29	90·	87·90
104	,,	,,	,,	13·11	1 66	·46	84·77	911·78	91·5	..
105	,,	,,	,,	10·93	1·25	·62	87·20	911·90	89·	87·30
106	,,	,,	,,	12·79	1·03	·66	85·52	910·11	93·	..
107	April	,,	County Sligo	12·36	3·24	·87	83·53	910·11	93·	..
108	,,	,,	,, ,,	11·02	1 89	·87	86·22	911·76	91·	..
109	,,	,,	,, ,,	14·61	3·86	·85	80·68	910·91	90·5	88·46
110	,,	,,	,, ,,	14·12	2·28	1·06	82·54	912·80	90·	..
111	,,	,,	County Galway	13·78	·90	·85	84·47	912·41	91·5	86·79
12	,,	,,	,, ,,	10·24	3·99	1·22	84·55	911·41	92·5	87·79
13	,,	,,	,, ,,	11·75	3·33	1·93	82·99	911·51	93·	87·51
14	,,	,,	,, ,,	15·17	1·96	1·99	80·88	911·28	92·5	87·66
15	,,	,,	,, ,,	14·37	3·21	1·89	80·53	909·37	94·5	89·90
16	,,	,,	,, ,,	14·50	1·44	1·61	82·45	909·39	95·	89·80
17	May	,,	Cornwall	15·70	1·54	1·49	81·27	911·78	92	..

glass or earthenware vessels. We have found that whilst some of the finest and best prepared butters undergo little or no change, there is in others a gradual disappearance of the characteristic principles of butter, and a consequent assimilation to the constitution of an ordinary animal fat. This change, which appears to be due to an incipient fermentation, and is generally accompanied by the development of fungi, is probably caused either by the use of sour cream or by insufficient care in making the butter.*

Laboratory, Somerset House,
31*st May,* 1876.

VII.—*Annual Report of the Consulting Chemist for* 1876.

By Dr. AUGUSTUS VOELCKER, F.R.S.

IN presenting the customary Annual Report on the chemical work done by the Consulting Chemist, I would remark that the number of analyses made for Members of the Royal Agricultural Society during the period between December, 1875, and December, 1876, has exceeded that of last year by 16, and has reached 720, which number has been exceeded only once, and then only by 10, viz. in 1871.

The increase, as will be seen by the appended tabulated summary, is due mainly to the unusually large number of oilcakes which were sent to the laboratory for examination. Some cases of grossly adulterated linseed-cakes have come under my notice; but as these have already been referred to in my Quarterly Reports, no further mention of them is required in the Annual Report, and I only allude to them for the purpose of observing that few cases of that kind have come under my notice in 1876. It must not, however, be inferred from this remark that cakes which are now sold in England as "pure" or "genuine" linseed-cakes are, with few exceptions, in reality what they profess to be. This is by no means the result of my experience, for I regret to say the reprehensible practice of oilcrushers and cake-dealers to sell genuine linseed-cakes, and even cakes branded "pure," which are made from dirty unscreened linseed, after having received a temporary check, is again on the increase. As repeatedly stated in former Reports, linseed as "imported" is often very foul, and many cargoes, especially cargoes shipped from the Baltic to Hull, contain from 15 to over 30 per cent. of small weed-seeds, broken grain, and dirt; and in some samples of linseed "genuine as imported," I have found more than 50 per cent. of dirt and worthless foreign seeds.

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* The commercial value of butter is affected by flavour more than by any other consideration, and this unfortunately cannot be expressed by an analysis, however carefully it may have been made. There is, however, one point which will be noticed at once on glancing at the butter-analyses in Table II., and which appears to have escaped Mr. Bell's notice. It will be perceived that the percentage of curd in different samples of butter varies greatly. Of all constituents of butter, the curd tends most to spoil it in keeping. The more effectually the curd is removed, or what comes to the same thing—the more effectually butter is washed and kneaded, the better it keeps, and the finer will be the flavour, other circumstances being the same, when the butter is brought to market. Butter full of butter-milk always contains comparatively much curd, and in warm weather such butter becomes rancid in a very short time, say in a few days. —[EDIT.]

Linseed-cake, which is made from linseed as imported, therefore may be, and, as a matter of fact, frequently is, cake which in point of nutritive quality and commercial value is not to be compared with cake made from well-screened linseed. Such inferior cakes, although they are made from linseed as imported, should not be sold as "genuine linseed-cakes," for a mixture of linseed with 20 or 30 or 50 per cent. of foreign weed-seeds, sweepings of granaries and similar rubbish, as the case may be, cannot be called "genuine," and by making a discrimination between "pure" and "genuine" linseed-cake the door is at once opened to fraud. There is no difficulty whatever in separating the small foreign weed-seeds and fine sand and earth which occur in most unscreened samples of linseed; nor in pressing into "pure linseed-cake," seed which, although not absolutely free from foreign seeds, does not contain more than 4 to 5 per cent. of impurities.

Many cakes have passed through my hands made from dirty linseed as imported, and sold as "genuine." These I do not hesitate to denounce as much inferior to adulterated linseed-cakes made from clean linseed with an admixture of from 30 to 40 per cent. of bran and pollard, or a similar percentage of rice-meal, Indian corn, or other wholesome farinaceous meals.

It is greatly to be regretted that many farmers will not give the price at which it is possible for oilcrushers and dealers to sell really pure linseed-cake. For the sake of an additional 5*s.* or 10*s.* a ton many a farmer runs the risk of buying, instead of a pure linseed-cake, an inferior article made from unscreened dirty seed, and which, although it may be nominally 10*s.* cheaper than pure linseed-cake, in reality often is worth from 30*s.* to 2*l.* less per ton than the necessarily higher priced pure cake.

I have before me a circular of a Hull firm in which about a dozen kinds of "pure linseed-cakes," mostly distinguished by various brands, were offered for sale in the month of September of the current year (1876), at prices varying from 9*l.* 7*s.* 6*d.* to

11*l.* a ton. The lowest-priced cake is introduced into this circular in the following terms: "A parcel of linseed-cakes made entirely of fine Bombay linseed, kiln-dried, and branded 'pure,' we can do at 9*l.* 7*s.* 6*d.*"

Leaving this exceptional, and, as it appears to me, very questionable, kiln-dried pure linseed-cake out of consideration, as also pure Marseilles cake quoted at 9*l.* 17*s.* 6*d.*, there is a difference of 32*s.* 6*d.* per ton between the lowest priced and the highest quotation of a number of Hull-made, professedly pure linseed-cakes, which appears to support the opinion I have just expressed, namely, that linseed-cakes are sold as "pure" at the present time, which, although not purposely adulterated, ought not to be branded "pure" and sold as such.

Compound linseed-cakes, or professedly mixed cakes, not unfrequently are branded "best;" and consumers of cake, tempted by the difference of some 15*s.* or 20*s.* between the price of such *best* cake and pure linseed-cake, and believing that they are buying pure linseed-cake, are too apt to be led astray, and, on the strength of the "best brand," are liable to pay 20*s.* or 30*s.* more than such cakes are really worth.

I have considered it my duty to refer to these matters, because I know that mal-practices of cake-crushers and dealers are again gradually extending all over England. I would therefore urge upon the Members of the Society to put into practical operation the forms of guarantee recommended by the Chemical Committee to intended buyers of linseed-cakes.

Decorticated cotton-cake from America I have never found adulterated. At the present price it is the cheapest article of food that can be used by feeders and fatteners of stock, who will do well to mix it with Indian-corn-meal in equal proportions when feeding cattle in winter, or in the proportion of one of cotton-cake and two of Indian corn during the warmer months of the year.

A very useful grain to mix with decorticated cotton-cake, reduced to meal or finely broken up, is rice. The quality of rice-meal, I find, varies very much, as will be seen by the following analyses of three samples sent to me for examination lately by Members of the Society.

The sample No. 1, it will be seen, contained much less oil and albuminous compounds, and more indigestible woody fibre than the two others. In No. 3, the proportion of oil was even greater than in the best oilcake, and this sample contained but little woody fibre. It is therefore, unquestionably, a valuable fattening meal. Although the meals No. 1 and No. 3 were sold at about the same price, the analyses of the two samples clearly prove the superior fattening value of No. 3; they also afford

COMPOSITION OF THREE SAMPLES OF RICE-MEAL.

	No. 1.	No. 2.	No. 3.
Moisture	9·47	6·07	7·51
Oil	3·77	10·30	13·53
*Albuminous compounds (flesh-forming matters) ..	6·56	12·69	12·37
Starch and digestible fibre	58·96	56·67	54·94
Woody fibre (cellulose)	13·77	5·57	3·90
Mineral matter (ash)	7·75	8·70	7·75
	100·00	100·00	100·00
* Containing nitrogen	1·05	2·03	1·98

a good illustration of the benefit which practical men may derive from the chemical examination of feeding-stuffs, which, although sold under the same name, vary greatly in feeding value. I consider the rice-meal marked No. 3, to be worth at least 1*l.* a ton more than the sample marked No. 1.

Another article of food which enters into the composition of most spiced cattle-foods and many compound feeding-cakes is locust-meal. The composition of locust-beans has been repeatedly determined by me and quoted in former Reports, but I am not aware that the hard seeds enclosed in the sweet pod have ever been analysed before.

The seeds are very hard, and in an unbroken state very indigestible. However, when split and steamed for some time, they swell out and get soft, and in this condition may be given to cattle with advantage as a useful fattening food. A sample of locust-bean kernels or seeds recently analysed by me had the following composition:—

Composition of Locust-Bean Seeds.

Moisture	11·19
Oil	·97
*Albuminous compounds (flesh-forming matters) ..	5·94
Mucilage, sugar, and digestible fibre	76·29
Indigestible woody fibre	3·62
Mineral matter (ash)	1·99
	100·00
* Containing nitrogen	·95

The paper which I published in a late number of the Society's 'Journal,' "On the Theoretical and Practical Feeding and Manuring-value of Purchased Food," has elicited much correspondence on the subject, and appears to have attracted attention both in France and in Germany,—my paper having been translated into French and German, and published in the agricultural and scientific journals of France and Germany.

Of the large number of waters (63) analysed for Members of the Royal Agricultural Society, I regret to say that a considerable proportion was found to be largely contaminated with sewage or injurious drainage products, and therefore utterly unfit for drinking-purposes.

As an example of such a water, one out of many, all showing that the water-supply in rural districts is still very defective, I may quote the following analysis. The water had a slightly yellow colour, and left a brown-coloured residue, which on exposure to a strong heat turned black, and gave off offensive-smelling fumes.

An imperial gallon contained:—

	Grains.
Organic matter	·78
Phosphate of lime and oxide of iron and alumina (containing ·49 of phosphoric acid)	1·05
Carbonate of lime	22·39
Sulphate of lime	33·71
Nitrate of magnesia	13·47
Nitrate of soda	11·03
Chloride of sodium (common salt)	27·65
Alkaline carbonates	7·80
Soluble silica	3·50
Total solid constituents	121·38
Actual (saline) ammonia	·007
Organic (albuminoid) ammonia	·042

Only two samples of potash-salts were sent to me for examination during the past season, a fact which appears to indicate that potash-salts are not used extensively in England for agricultural purposes. The fact is, potash-salts have not been found in England to confirm the high expectations as to their fertilising value which were entertained of them at one time.

On the other hand, nitrate of soda is growing more and more in favour with agriculturists. In consequence of this, as many as 61 samples, that is, a larger number than in any previous year, were sent for analysis, and none of them were found fraudulently adulterated; but some were not up to the guaranteed quality at which they were sold, and compensation for the deficiency in value was readily granted, the sales having been made on the strength of a guaranteed quality. The majority of samples contained over 94 per cent. of chemically pure nitrate of soda.

In speaking of nitrate of soda, I am reminded of an accident which occurred last July in hauling, by means of a locomotive engine, a waggon laden with artificial manure and nitrate of soda from the Tunbridge Railway Station to a farm in the country. This accident illustrates the danger of a spark of fire coming in contact with bags containing nitrate of soda and with wood or other combustible materials.

Mr. Thomas Aveling, my informant, wrote to me as follows:—

> "Dear Sir, "Rochester, July 26th.
>
> "The following are the particulars of the nitrate of soda fire case. On the 8th instant, a road locomotive engine, belonging to Mr. Whitfield, was employed hauling waggons laden with artificial manures from the Tunbridge Railway Station to the farm of Mr. Rales at Hadlow. Immediately the engines started, the first waggon, containing two tons of nitrate of soda, was observed to be on fire. Volumes of smoke, accompanied by a considerable hissing noise, burst from the bags, and so quick was the combustion that it was found to be impossible to save the waggon, which was entirely burnt. The soda became a burning liquid, as it ignited and flowed some yards over the road. Water had no effect in extinguishing the fire. The engine-driver was rendered insensible by the fumes in his endeavour to detach the engine from the train. Would any mixture of lime, &c., with the nitrate of soda cause spontaneous combustion, or is the accident to be attributed solely to a spark from the engine? I send a specimen of the residuum.
>
> "Yours faithfully,
>
> "Dr. A. Voelcker." "Thomas Aveling.

On examination of the specimen sent to me by Mr. Aveling, I found it to be chiefly fused nitrate of soda.

Nitrate of soda is a readily fusible salt, and, like ordinary saltpetre, is a strong supporter of combustion, for at an elevated temperature it gives off a large quantity of oxygen. The nitrate of soda bags are necessarily impregnated with this salt, and are in much the same condition as touchpaper or a fusee. A single spark from an engine or a lucifer-match carelessly thrown amongst a lot of nitrate of soda bags, under favourable circumstances, may kindle the bags, and any combustible matter, such as wood, upon which they are placed; and when once the fire is started, the heat will soon become so high as to fuse the nitrate of soda, which in this fused state, as described by Mr. Aveling, will spread like liquid fire, and render its extinction by water extremely difficult, if not impossible.

During the last twelve months numerous samples of Peruvian guano passed through my hands. The former supplies from Guanape and Macabi islands, containing on an average about 12 per cent. of ammonia, being exhausted, the deposits in the South of Peru have been taken in hand by the contractors for the sale of Peruvian Government guano. The Southern deposits are now and will be the main, if not exclusive, sources from which Peruvian guano will be supplied in future.

At present most of the cargoes are shipped from the following deposits in the south of Peru: Pabillon de Pica, Independencia, and the Lobos Islands.

As far as I have been able to gather information, the Pabillon de Pica guano now imported into England consists of three varieties, namely:—

1. Pabillon Guano.
2. Huanillos Guano.
3. Punta de Lobas Guano.

The Pabillon de Pica deposits are dry, powdery, and fine guanos, and, as regards condition, greatly superior to Guanape and Macabi guanos.

The most valuable of the three varieties of Pabillon de Pica guano is that of Pabillon proper. Of a number of analyses of guano from South Peru, I quote only a few, with a view of giving a fair representation of the several qualities of some of the deposits, cargoes of which have been already shipped to England.

COMPOSITION OF SAMPLES OF PABILLON GUANO.

	No. 1.	No. 2.	No. 3.	No 4.	No. 5.
Moisture	13·20	8·63	9·93	14·28	11·89
*Organic matter and salts of ammonia	42·05	38·17	40·29	40·12	38·81
Phosphate of lime	26·65	25·97	24·98	28·51	28·80
†Alkaline salts	12·63	18·29	19·47	12·87	14·99
Insoluble siliceous matter ..	5·47	8·94	5·33	4·22	5·51
	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen ..	9·81	8·22	8·49	8·88	8·53
Equal to ammonia . ..	11·91	9·98	10·31	10·78	10·36
† Containing soluble phosphoric acid	1·79	·79	1·30	1·70	1·76
Equal to tribasic phosphate of lime	3·91	1·72	2·83	3·71	3·82
Total percentage of phosphoric acid	13·99	12·68	12·74	14·76	14·94

Many of the samples of Pabillon guano analysed by me contained fully 10 per cent. of ammonia and 25 to 28 per cent. of phosphate of lime, and, without exception, all were dry and in a fine condition.

COMPOSITION OF SAMPLES OF HUANILLOS GUANO.

	No. 1.	No. 2.	No. 3.	No. 4.
Moisture	22·41	15·69	17·60	16·35
*Organic matter and salts of ammonia ..	31·14	39·70	36·85	37·15
Phosphate of lime	24·15	26·31	23·95	24·85
†Alkaline salts	17·59	14·05	17·59	17·42
Insoluble siliceous matter	4·71	4·25	4·01	4·23
	100·00	100·00	100·00	100·00
* Containing nitrogen	7·65	8·05	7·86	7·51
Equal to ammonia	9·28	9·78	9·54	9·11
Containing soluble phosphoric acid	2·91	2·59	2·88	2·91
Equal to tribasic phosphate of lime	6·35	5·59	6·28	6 35
Total percentage of phosphoric acid	13·97	14·61	13·85	14·29

The samples of Huanillos guano analysed by me contained, as a rule, somewhat less ammonia, more soluble phosphoric acid, and generally more moisture than Pabillon guanos.

COMPOSITION OF SAMPLES OF PUNTA DE LOBOS GUANO.

	No. 1.	No. 2.	No. 3.	No. 4.
Moisture	7·67	8·71	7·97	8·09
*Organic matter and salts of ammonia ..	29·53	34·34	32·32	27·07
Phosphate of lime	38·55	30·31	33·49	41·48
†Alkaline salts	19·33	21·65	22·28	17·65
Insoluble siliceous matter	4·92	4·99	3·94	5·71
	100·00	100·00	100·00	100·00
* Containing nitrogen	5·88	6·79	6·05	5·09
Equal to ammonia	7·14	8·25	7·35	6·18
Containing soluble phosphoric acid	1·44	1·66	1·37	1·16
Equal to tribasic phosphate of lime	3·14	3·62	2·99	2·54
Total percentage of phosphoric acid	19·09	15·54	16·71	20·16

These samples of Puntas de Lobos guanos, it will be seen, were poorer in ammonia, but richer in phosphates than Pabillon and Huanillos guanos.

COMPOSITION OF SAMPLES OF GUANO FROM INDEPENDENCIA BAY.

	No. 1.	**No. 2.**	**No. 3.**	**No. 4.**
Moisture	8·17	8·18	9·74	8·68
*Organic matter and salts of ammonia ..	35·93	33·72	31·86	36·97
Phosphate of lime	21·92	19·85	20·26	18·50
†Alkaline salts	14·73	13·20	13·33	13·21
Insoluble siliceous matter	19·25	25·05	24·81	22·64
	100·00	100·00	100·00	100·00
* Containing nitrogen	7·64	8·06	7·33	8·53
Equal to ammonia	9·27	9·79	8·90	10·36
† Containing soluble phosphoric acid	1·12	·96	1·32	·70
Equal to tribasic phosphate of lime	2·44	2·09	2·88	1·53
Total percentage of phosphoric acid	11·16	10·05	10·60	9·17

These guanos from Independencia Bay were very dry, and nearly as rich in ammonia as the Pabillon deposit, but they were weak in phosphates and contained a good deal of sand.

Cargoes have been brought from two islands bearing the name of Lobos Island, one being Lobos de Afuera, and the other Lobos de Tierra.

COMPOSITION OF SAMPLES OF LOBOS ISLAND GUANO.

	No. 1.	**No. 2.**	**No. 3.**	**No. 4.**
Moisture	21·19	21·79	24·95	11 90
*Organic matter and salts of ammonia ..	18·49	20·07	19·45	16·90
Phosphate of lime	42 07	40·24	37·10	50·97
Alkaline salts	11·46	11·52	8·76	11·93
Insoluble siliceous matter	6·79	6·38	9·74	8·30
	100·00	100·00	100·00	100·00
* Containing nitrogen	3·48	3·67	4·07	2·97
Equal to ammonia	4·22	4·46	4·94	3·60
† Containing soluble phosphoric acid	2·33	1·27	1·08	·86
Equal to tribasic phosphate of lime	5·08	2·77	2·36	1·87
Total percentage of phosphoric acid	21·60	19·70	18·01	23·35

These samples of Lobos Island guano, it will be seen, were poor in ammonia and rich in phosphates. Their condition generally was good, but I need hardly say that they were much inferior in value to the deposits at Pabillon de Pica and Independencia.

Messrs. J. H. Schröeder and Co. are the general agents for the sale of Peruvian Government guano in the United Kingdom, under Dreyfus Brothers and Co's. contract with the Peruvian Government. Under the contract of the 7th of June, 1876, the Peruvian Government likewise consign guano to the Peruvian Guano Company, Limited:—a new Company, who have appointed Mr. W. A. Rau as their agent. In a circular issued by this new Guano Company it is announced that the sale-price of each cargo will for the future be fixed on a scale based on the chemical analysis of an average sample of it; but no mention is made of this scale. In the absence of information as to what the scale is to be, it is impossible to form an opinion whether or not the price at which each cargo will be sold will correspond, as stated in the circular, exactly with the real value of the guano as a fertiliser.

The system of selling Peruvian guano on the basis of an analysis is no doubt sound and just in principle; but in order to carry it out in practice, so that it may be beneficial to individual farmers, who buy half a ton or one or two tons of guano at a time, it appears to me most desirable for the contractors to incorporate, at the different ports of importation, high and low quality guano, of a good friable character, into one fairly uniform bulk, and to sell but one quality to the retail dealer on the basis of a guaranteed analysis. Any wet or damaged cargoes should be treated—as is done by Messrs. Ohlendorff—with sulphuric acid, and made into a dissolved Peruvian guano, the quality of which can be guaranteed by analysis with great precision.

The preceding analyses show plainly how variable are the qualities, and consequently the value, of the different guano deposits in South Peru; hence the guarantee that all guano sold by the New Peruvian Guano Company, Limited, is genuine as imported from Peru has lost the significance it once possessed, for, in point of fact, some of the deposits are poor enough without any adulteration.

If good and bad guano, varying greatly in quality, were thrown into the retail market, the consequence would be, it strikes me, that many guano dealers would in preference buy from the consignees cargoes of low quality, for which they probably would not have to pay more than 8*l.* 8*s.* to 9*l.* 9*s.* a ton, and be strongly tempted to sell such low-quality samples at something like the price which farmers hitherto have been in the habit of paying for genuine Peruvian guano. Dealers and others who buy 30 tons of guano at one time can take care of their own interests; but it is the small farmer who will be placed at the mercy of the country dealer, if all kinds of Peruvian guano, some of a very questionable character, are thrown upon the market, and all of them sold as "Genuine as imported from Peru." In the interest of the agriculturists, I would therefore strongly urge upon the Peruvian Government officials the propriety of equalising the various qualities, and of instructing their agents to sell only one quality, to fix the price of the guano in accordance with its intrinsic value as ascertained by analysis, and to give a reasonable guarantee with the sales of their guano.

Of other kinds of nitrogenous guanos, the yearly imports of which into England do not amount to many thousands of tons, Ichaboe and Saldanhay Bay guano require to be noticed.

On Ichaboe and other islands, near the coast of South Africa, guano-beds were discovered some thirty years ago. These beds, formed in the course of many years by the dung of sea-birds, were shipped to England in large quantities soon after their discovery, but they have long since been exhausted.

The original deposits on Ichaboe and Saldanhay Bay were guanos, which, having been exposed to climatological influences, had in the course of time lost more or less of their original nitrogenous constituents.

These guanos occupied an intermediate place between the more recent and better preserved highly nitrogenous sea-birds' excrements, and the purely phosphatic guanos.

In a paper on "Phosphatic Guanos," which appeared in the last volume of the 'Journal of the Royal Agricultural Society,' the formation of phosphatic guano from the excrements of sea-fowls is briefly described. In explaining this subject I referred to Ichaboe guano in terms which, without qualification, may appear to reflect prejudicially upon the quality of the present importations of Ichaboe and Saldanhay Bay guano. I therefore embrace the first opportunity which presents itself, to remove any unfavourable impression which my remarks may have made upon the reader respecting the quality of these guanos. These remarks refer to the original guano-beds on Ichaboe and Saldanhay Bay, and do not apply to the importations which have been made into England since the exhaustion of the original beds.

My attention was directed to this matter a short time ago by Mr. Daniel de Pass, who is one of the proprietors of the Ichaboe group of islands. This gentleman informs me that he and his partners came into possession of these islands soon after the large deposits were removed in 1843, and after several parties had shipped the refuse guano in 1849, and, finding it worthless, sold their rights to export the guano. At first there was hardly a bird to be seen on these islands, but, by protection at the breeding season, in the course of twenty-three years the birds have multiplied to such an extent that they are now obliged to settle on adjacent islands. The birds remain on these islands about nine months. They begin to lay as soon as sufficient dung has accumulated to serve as nests for the eggs. After the hatching season is over, and the birds are strong enough to shift for themselves, they leave the island—generally about March—and return again in June. During the interval the excrements are collected, and at once pitted and placed ready for shipment. The nests of the guano-birds thus appear to be made by their burrowing in the sun-dried and hardened birds'-dung. If, as on very rare occasions, rain intervenes, the nests get wet and the eggs are destroyed. The present supplies of Ichaboe and Saldanhay Bay guano, it will thus be seen, are the dried recent excrements of sea-fowls, which feed upon the enormous quantities of small fish that frequent the waters surrounding these guano islands. The fact that the guano is collected in localities rarely visited by rain, and before the recent deposits have undergone deterioration by dampness of the air or other influences, explains the presence of a high percentage of nitrogen, and the superior fertilising value of the present importations of Ichaboe and Saldanhay Bay guano. Most shipments are made to Leith, and the guano finds a ready sale in Scotland, as it is rich in nitrogen and phosphates, and is in a fine and dry condition. Different cargoes of the recent dry birds'-dung, I am informed, seldom contain less than from 13½ to 16 per cent. of ammonia.

A sample of Saldanhay Bay guano recently analysed by me had the following composition;—

Moisture	22·25
*Organic matter and salts of ammonia	37·43
Phosphate of lime	18·24
†Alkaline salts	3·59
Insoluble siliceous matter	18·49
	100·00
* Containing nitrogen	9·29
Equal to ammonia	11·28
† Containing soluble phosphoric acid	·99
Equal to tribasic phosphate of lime	2·02
Total percentage of phosphoric acid	9·35

The guano was dark-brown, and had a strong pungent smell, which is partly due to volatile carbonate of ammonia.

Ichaboe guano, as now imported, has a light-brown or yellow colour, and generally is mixed with a good many feathers of the birds that produce the deposit.

The following is an analysis which I made in the course of the current year of a sample of such light-brown Ichaboe guano.

Composition of a Sample of Ichaboe Guano.

Moisture	17·01
*Organic matter and salts of ammonia	41·54
Phosphate of lime	20·18
Carbonate of lime	1·89
Alkaline salts	2·53
Insoluble siliceous matter	16·85
	100·00
* Containing nitrogen	10·07
Equal to ammonia	12·23

The sample, it will be seen, was drier and richer in ammonia than the preceding sample of Saldanhay Bay guano. It yielded 12¼ per cent. of ammonia, or about the same amount which occurs on an average in good cargoes of Guanape and Macabi guano, and thus has to be classed with Peruvian and other highly nitrogenous guanos.

The following are the papers contributed by me to the pages of the March and September numbers of the 'Journal of the Royal Agricultural Society' for 1876:—

"On the Theoretical and Practical Value of Purchased Food, and of its Residue as a Manure."

2. "Annual Chemical Report for 1875."

3. "On Phosphatic Guanos."

Analyses made for Members of the Royal Agricultural Society from December, 1875, to December, 1876.

Superphosphates, dissolved bones, and compound artificial manures	171
Bone-dust	57
Guanos	28
Nitrate of soda	61
Sulphate of ammonia	7
Potash-salts	2
Refuse-manures	49
Limestones, marls, ironstones, and other minerals ..	20
Soils	21
Waters	63
Sewage	3
Sewage-manures	4
Oil-cakes	206
Feeding meals	15
Milk and cream	5
Bread	1
Examinations for poison	7
	720

VIII.—*Quarterly Report of the Chemical Committee, December*, 1876.

THE Chemical Committee called attention to the following cases. In No. 1 the crushers made compensation to the amount of 2*l.* per ton. In No. 2 the dealer was a neighbour, and as too frequently happens, in consequence, the complainant refused to furnish further information on the subject. No. 3 was published to show that crushers who profess to have the most perfect machinery may yet, from carelessness or neglect of their machinery, be liable to send out an impure cake. No. 4 showed how unscrupulous persons attempt to take advantage of the action of the Committee to cover their own carelessness or neglect of precaution in making their purchases.

1. A sample of linseed-cake was sent to Dr. Voelcker for analysis by Mr. Robert Wyatt, of Acton Hill, Stafford. One ton had been bought by him as "pure linseed cake," at 12*l.* 10*s.* per ton, from a dealer at ——, who stated that the cake had been obtained from a Hull firm, and that he believed it to be perfectly pure, as he had received a duplicate of the following warranty with it:—

"WARRANTY.

"PURE LINSEED CAKE.—We hereby guarantee that the cakes sold to you as per order bearing date the day of , 187 , are made entirely from fine sound screened linseed, and free from any adulteration.

"This warrant to be subject to the analysis of Dr. Voelcker or Professor Anderson.

* * * the day of , 187 ."

The following is the analysis of the sample submitted to Dr. Voelcker:—

Moisture	8·41
Oil	15·24
*Albuminous compounds	25·88
Mucilage, &c.	32·39
Woody fibre	12·47
†Ash	5·61
	100·00
* Containing nitrogen	4·14
† Containing sand	1·10

A microscopic examination showed that the cake was not pure, but was adulterated with earth-nut or ground-nut cake. On the agent being informed of Dr. Voelcker's report, he wrote to the crushers, and a correspondence ensued, which terminated with the following arrangement being made with the purchaser, as stated by him in a letter to Dr. Voelcker:—

"The cake that you analysed in June last, and found to be adulterated with earth-nut cake [the crushers] have written to me to say that it was from a lot they had bought as pure linseed; but as you considered it not to be worth by 2*l.* a ton the price I was to pay for it, they are willing to make that deduction."

2. Another sample of linseed-cake was sent by a bailiff on a home farm. He had paid 11*l.* 10*s.* per ton for this cake, which was found to be either adulterated, or a mixed and inferior linseed-cake. Dr. Voelcker having applied for information as to the vendors, and for other particulars in the usual manner, received the following reply:—

"In answer to yours of October 25th, I beg to state that the linseed-cake was not guaranteed a pure linseed-cake, for in truth I do not think I asked any question in that form. I pay 11*l.* 10*s.* per ton. The sample I sent was from one ton I bought of a corn factor, whose name I would rather not mention. The family are near neighbours of ours, and I almost daily am in communication with them. In fact, sir, I do not wish to put my fingers into hot water."

3. A sample of linseed-cake sent for preliminary examination and report was found by Dr. Voelcker to be made from dirty linseed. Dr. Voelcker, in sending his first report, requested to be furnished with a whole cake for more complete examination and analysis. The purchaser thereupon forwarded it, with the statement that it was warranted pure.

Another cake of the same sample was forwarded by the crushers themselves, and the following are the analyses of the cakes:—

SAMPLE SENT BY PURCHASER.

Moisture	11·46
Oil	10·39
*Albuminous compounds	27·43
Mucilage, &c.	30·03
Woody fibre	11·43
Ash	9·26
	100·00
* Containing nitrogen	4·30
† Containing sand	4·35

SAMPLE SENT BY CRUSHER.

Moisture	11·49
Oil	9·96
*Albuminous compounds	28·01
Mucilage, &c.	30·13
Woody fibre	10·47
†Ash	9·94
	100·00
* Containing nitrogen	4·48
† Containing sand	5·05

The crushers observe in their reply —

"In sending you this cake for examination we wished to act perfectly *bonâ fide*, and to inform ourselves whether there were any sufficient grounds for the complaint made by our customer. Your report points to an undue proportion of small weed-seeds and sand, and we must admit that, after careful investigation, we have strong reason to believe that this is fully accounted for by the fact that the screens intended to remove all objectionable substances of this kind as far as possible have been systematically neglected by the foreman, in whose charge they were, and the cakes have consequently suffered. It is needless to remind you, whose practical knowledge of the various branches of the crushing trade is so extensive, that fine linseed invariably contains more or less admixture of dirt and of seeds other than linseed, and even after careful screening, some such qualification of the term "pure" must necessarily be applied when a cake from linseed or cotton-seed is so described."

4. Another cake bought from a firm at Hull, by sample, as "genuine" linseed-cake at 8*l.* 10*s.* per ton, was found on analysis poor in oil and albuminous compounds, and with an excess of woody fibre.

The crushers insisted, however, that the sample by which it was sold (but which the purchaser stated he had not kept, thinking he was dealing with respectable people) was the only thing to go upon, that he ought to have had it analysed before he made his purchase, that the supply was exactly of the same quality, and that he knew that he was not buying the best cakes (having been himself formerly in the trade), and that, in fact, what he was buying he was bound to pay for. They subsequently sued him in the county court, and he eventually paid the claim, with some slight abatement.

The following are extracts from the correspondence between the parties which took place:—

VENDORS TO PURCHASER.

"In reply to your letter of the 7th, please carefully read over again our last letter. *You knew well what you were buying.* Between you and us there is no mistake. Between you and your customer we have nothing to do: what you represented to him we are not responsible for. We take no risk you may have run, and will take no responsibility of law or anything else that may occur. The whole thing is on your own shoulders; our claim is very clear against you for 27*l.* 10*s.*, which amount we request you to *pay at once.*"

PURCHASER TO VENDORS.

"Having been some time in London, your letter with reference to the adulterated cake remains unanswered. From inquiries I find that it is my duty to prosecute you for selling adulterated articles, and you would be liable for many penalties.

"This I have no wish to do, and if you will put yourself in form will meet you.

"The only course I can suggest, without prejudice, is that a sample of the cake be sent to Dr. Voelcker for analysis, and that if it has any feeding value, I pay you that value, and that all expenses be paid by your firm. If this does not meet your views, I shall reserve to myself the right of placing the matter in the hands of the Royal Agricultural Society, of which I am a member, and this without further notice. I am determined to have the matter settled without delay."

VENDORS TO PURCHASER.

"Your two last letters are to hand. We recommend you to read over the whole of the correspondence, and see how the matter really stands. When the sample was sent, you ought, if you wished it, to have got it analysed *before* you ordered two tons. We stand on the sample. If the two tons are similar to the sample then we are right, and you must pay the full price you agreed to pay. You have been long enough in the trade to know that cakes quoted 8*l.* 10*s.* (on the same printed list with other cakes quoted 10*l.*) could not be the best. *You want an allowance;* if it is a very moderate one, say what it is before we go to law, and, *without prejudice*, we will consider what course is the best to take. We have had these cases tried before, and always won. Our lawyer here is well up to the business, and knows the right course to take."

PURCHASER TO VENDORS.

"I must refer you to mine of the 28th September. It is the only fair means of settling the matter, and under the circumstances more favourable to you than myself. I do not wish to put the matter in the hands of the R.A.S.E. If I am to do so, you know the spirit in which they will take it up. Write me that you will adopt that course by return. I will send a sample to Dr. Voelcker, without my name, and pay you the value he puts on the cakes. What more can you ask? It is right that you should bear this trifling expense. If you do not agree to this at once, I must send sample with full particulars."

IX.—*Report on the Progress of the Investigations into the Nature of Pleuro-Pneumonia and Foot-and-Mouth Disease now being conducted at the Brown Institution.* By DR. BURDON-SANDERSON, F.R.S., Professor-Superintendent of the Institution.

PLEURO-PNEUMONIA.

AS already reported in Vol. XII., Part II., the experiments on Pleuro-Pneumonia were not begun till the end of August, when the animals were in perfect health and in as good condition as when they arrived at the Institution.

The first animals subjected to experiment were two yearlings. In one of these, the exudation liquid, with which the lungs of diseased animals in the developed stage of the disease abounds, was injected into the circulation. The liquid was used in an entirely undiluted state, and was derived from the lungs of animals just slaughtered. In performing the operation, the greatest care was taken to avoid the entering of the infecting liquid into the cellular tissue. The other animal was inoculated subcutaneously by injection into the cellular tissue. This case was also carefully watched. No effects were observed, except slight primary swelling at the seat of inoculation.

On the 3rd of November a good opportunity offered for the inoculation of a greater number of animals; liquid of the same kind was used, and was injected into the circulation of three animals, viz., 2 two-year-olds and the yearling which previously had been inoculated in the cellular tissue and had continued throughout in perfect health. On the same day a cow was inoculated in the way ordinarily adopted for prophylactic purposes, viz., in the tail. In this case slight swelling and tenderness ensued about the fourth day. The swelling increased very slowly up to the tenth day, after which it began to subside. But after the fourteenth day signs of softening appeared at the seat of the puncture, and eventually a small slough was formed which corresponded exactly with the line of puncture by the needle. Since that period the process has gone on in the neighbouring tissue, so that at present the end of the tail, from a little above the seat of the inoculation is undergoing slow necrosis. It is further to be noted that the swelling, up to the present time, has not extended to any distance from the seat of disease, and that the animal is still in perfect health and fair condition.

On November 10th, a calf nearly two months old was inoculated by injection into the venous system, in the same way as has been already described. There was in this case some local reaction, lasting for over a week, a circumstance probably attributable to the greater difficulty of performing the injection without interfering with the tissues in the neighbourhood of the vein. There has, however, been no general disturbance of the system.

Although I am not able to express an opinion as to the main question, it is worth while pointing out that the present experiments show in the most convincing manner, that not only subcutaneous inoculation with diseased material can be performed without danger, if the necessary precautions are used, but that the more serious operation of injecting pulmonary exudation liquid into the circulating blood, is not attended with any immediate results.

FOOT-AND-MOUTH DISEASE.

The experiments on Foot-and-Mouth Disease were begun early in June. In the order of dates they are as follows:

1. On June 12th, two cows were inoculated with saliva, collected fresh from diseased animals at Deptford; the mode of inoculation employed was by scarifying the gums.

2. On the 22nd of June, the same animals were again operated on by submucous puncture, the material employed being diseased epithelium taken fresh from unruptured vesicles.

3. On the 29th, the same two cows were fed with hay which had been steeped in the saliva of diseased animals. It was given within about three hours after its collection.

4. On July 11, the same method of inoculation as in Experiment 1 was again employed for the infection of two calves.

5. On Aug. 3, the same calves had their gums again scarified and saliva applied, and were then fed with a small quantity of hay soaked in the saliva of diseased animals.

6. On the 15th of August they were again fed with hay wet with the saliva of diseased animals.

7. In the following instances infection was attempted by the method of subcutaneous injection of saliva, in addition to the other modes of operating in the animals referred to :

In Experiment 1 . .	One animal.
„ 2 . .	„ „
„ 4 . .	„ „
„ 5 . .	„ „

8. On Oct. 28, the young calf, two months old, was injected subcutaneously with saliva.

9. The exudation material derived from the matrix of a diseased hoof, was mixed with neutral and non-irritating saline solution, and injected subcutaneously in three animals, each receiving three separate punctures, viz., one in the ear, the second in the perineum, and the third at the border of the hoof in the heel of the fore foot.

The general result of these experiments has been, that in every instance, without exception, the effect of subcutaneous puncture has been to produce a limited abscess, containing a slough, with scarcely any extension of inflammation to neighbouring parts. In the case in which the punctures were made at the border of the hoof, no effect could be observed.

With reference to the general question of the communicability of the disease, the results must as yet be regarded as negative.

It is proposed to continue the investigation as follows :—

As regards Foot-and-Mouth Disease, the experiments will be continued on the same plan, but new methods of infection on other animals will be tried.

As regards Pleuro-pneumonia, we propose

1. To repeat on those animals that have not yet been used for experiments on Pleuro-Pneumonia the injection into the circulation.

2. To repeat on some the subcutaneous injection.

3. To subject animals previously tested by injection to the inhalation of fresh dried material into the lungs.

4. To test the influence of cohabitation, by introducing some of the animals already experimented on by the other methods of infection referred to, into stables occupied by diseased animals; and

5. To have some of the others slaughtered, for the purpose of ascertaining whether or not, in the absence of any appreciable signs of infection, the lungs or other internal organs exhibit any latent changes, corresponding to undeveloped stages of the disease.

X.—*Report on the Health of Animals of the Farm*, 1876. By W. Duguid, M.R.C.V.S., Veterinary Inspector of the Society.

During the past year no very extensive or serious outbreaks of disease among animals of the farm have been reported, notwithstanding the great, and often rather sudden, changes of weather to which they have been exposed. The long continued low temperature, and frequently recurring frosts in March and April, proved especially injurious to ewes and lambs, and many deaths were reported from some of the northern and more exposed districts.

Some reports reached the Brown Institution of sheep dying from the effects of the excessive heat in July and August; but, on inquiry, the symptoms and *post-mortem* appearances described seemed to indicate that blood-poisoning, and not the direct effects of heat, had been the cause of death.

Contagious Diseases.

Stock-owners in this country suffered less during the year 1876 from diseases of this class than for several years past. The comparatively few outbreaks reported have been mostly limited in extent, and of a mild character.

Foot-and-Mouth Disease, which had prevailed very extensively over the whole of Great Britain in 1874–5, began to decline in the latter year, both as regards the number of animals affected and the character of the disease; the mildness of the attacks being indicated by the small proportion of instances in which the disease either recurred a second time or terminated fatally. Occurring, as it did, at the end of the year, this abatement of the disease was by many attributed to the usual limited movement of stock at that particular season, and it was accordingly prognosticated that, with the more extensive movement of animals during the spring and summer months, the malady would recur with its former virulence and frequency. These fears were not, however, realised; for during the past year the number of cases gradually and steadily decreased until what might be called a minimum had been reached, and the epizootic, which had caused so much loss some eighteen months before, had almost died out.

The Reports of Quarter Sessions at the beginning of October indicate that, as regards foot-and-mouth disease, many counties could then show a cleaner bill of health than they had possessed for several years. In several counties not a single case of the disease was reported, and in others only a few cases. Instances might be quoted in which the fresh cases had decreased to four per week, as compared with the weekly average of hundreds only some six months previously.

To show how readily the prevalence of contagious diseases among animals in this country may affect the exportation of pure-bred high-priced stock, it need only be mentioned that in the early part of the past year, when foot-and-mouth disease had considerably abated, the Secretary of the United States Treasury withdrew the order prohibiting the importation of cattle from Great Britain, which the American Government had considered it necessary to issue for the protection of their stock. At the same time a fresh order was issued, allowing the importation of blood-stock when accompanied by a certificate from an American Consul, stating that the animals were in a sound and healthy condition when shipped, and entirely free from foot-and-mouth disease.

Although we have suffered so little, some of our Continental neighbours have had, during the past year, to contend with rather wide-spread outbreaks of foot-and-mouth disease, and many foreign diseased animals have been landed at our ports. Thus during the summer, when anxious to obtain cases of this malady for observation, and material for experiment, the officers of the Brown Institution could not hear of any among home stock; in fact, none were to be found in the Metropolitan Cattle Market, which may usually be taken as a very good index of the amount of the disease present in the country. By the kindness and assistance of the Officers of the Veterinary Department of the Privy Council, material was obtained from foreign cattle, without which the experiments on foot-and-mouth disease could scarcely have been carried out this year.

There is reason to believe that the disease has again extended in this country; cases have recently been found among the home stock in the Metropolitan Cattle Market on more than one occasion.

Pleuro-Pneumonia.—The most active centres for the spread of this disease have always been the large town dairies and the most frequented lines of cattle traffic; and this seems to hold good in 1876 as in former years.

That it has not prevailed to any extent in the country is shown by the smallness of the sums which have been reported at Meetings of Quarter Sessions, as having been paid in compensation for animals slaughtered on account of this disease.*

It is gratifying to learn that some of our best feeding and grazing districts, in which this malady has prevailed in former years, can now show almost a clean bill of health. In Norfolk only a few cases were reported during three months; and during the same period there were only two fresh cases in Oxfordshire.

In Cumberland, a few fresh outbreaks occurred in the autumn, but they were not of an extensive character; and the strict enforcement of existing regulations was sufficient to check their progress.

During last Session of Parliament an Act was passed rendering the slaughter of cattle affected with pleuro-pneumonia compulsory in Ireland. This Act will, no doubt, tend in a very great measure to counteract whatever injurious influence may be attributable to the Irish cattle-trade as a means of spreading the disease. Although the system of inspection adopted at the ports of embarkation no doubt prevented actually diseased animals from being shipped to us from Ireland, we had no guarantee that the Irish cattle crossing the Channel had not been in contact with diseased animals, or even that they had not come out of an infected herd. The compensation now given for the diseased animals slaughtered on account of pleuro-pneumonia, and the periodical inspection to which all are subjected, will render Irish cattle a much safer purchase when this new law has been for some time in operation.

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* I do not feel satisfied that slaughter of affected animals will stamp out cases of pleuro-pneumonia, although it may lessen the spread of the disease when outbreaks occur. The Veterinary Department of the Privy Council report that in Great Britain, during the week ending 24th March, pleuro-pneumonia had been reported upon in 127 places, 89 beasts had been slaughtered, and 5 had died.

In the West Riding of the County of York, between March 1874 and March 1875, the cases reported were 426; of which 397 were slaughtered by the Local Authority, 6 were slaughtered by the owner, and 23 died. Between March 1875 and March 1876, 410 cattle were attacked, 401 were slaughtered by order of the Local Authority, 1 by the owner, and 8 died. Between March 1876 and March 1877, 249 cattle were attacked, 237 slaughtered by order of the Local Authority, 2 by the owner, and 10 died. The accounts of the West Riding, being made up from September in each year, do not exactly show the cost of the slaughter for the same period as are included in the record of the outbreaks, but the expenses incurred by the ratepayers of the West Riding for the three years ending September 1876 were, respectively, 4856*l.* 8*s.* 10*d.*, 3517*l.* 3*s.* 10*d.*, 4246*l.* 12*s.* 5*d.*; a total of 12,620*l.* 5*s.* 6*d.*, and 1040 cattle were slaughtered by order.—J. D. D.

Sheep Scab.—This disease has prevailed rather extensively during the past year. The large number of the cases returned is, however, no doubt chiefly attributable to the fact that in February an Order in Council was issued, enacting that where sheep-scab existed inspectors were to make a return with full particulars to the Local Authority and also to the Privy Council, such return to be given monthly so long as the disease existed in the district.

This periodical inspection of diseased flocks will probably soon lead to a marked diminution in the number of outbreaks, by preventing the movement of diseased animals, which is the principal, I may say the only, cause of its spread. Although this disease proves very troublesome and annoying, often entailing great loss by the falling-off of the wool, and the impoverished condition produced in the animals affected, it differs very materially from most other contagious diseases in being in its nature capable of being radically cured, provided that the means used are efficient, and are applied in such a way as to lead to the destruction of the parasites by which the affection is caused. The disease has prevailed chiefly in Dorset, Northumberland, Worcester, East Riding of Yorkshire, Durham, Cumberland, Brecon (chiefly hill districts), Cardigan, Oxford, and Berks.

Typhoid Fever in Pigs.—In 1875 many reports of outbreaks, some of a very extensive character, of this disease reached the Institution. During the past year, if the losses in particular outbreaks have not been quite so great, the number of localities in which the disease has existed is larger.

Among the piggeries in the suburbs of London it is frequently to be seen; but, in addition to these, I have had specimens sent me from Berks, Essex, Kent, Wales, and also from Aberdeen, where, as far as I can learn, it had appeared, or at least had been recognised, for the first time.

It would be, indeed, extremely difficult to obtain anything approaching correct statistics of the number of animals affected with this disease, not only on account of the little interest taken in diseases of the pig generally, but also from the fact that this particular disease has been confused with others; and thus carcasses of pigs sent as specimens of typhoid fever, when examined, have been found to have died from other acute affections.

That this disease is often spread by the sale and movement of infected animals, there can be little doubt, for I have found some difficulty in obtaining healthy animals for experimental work; and on inquiry I am usually told by people, who have had it among their stock, that the disease had appeared soon after the purchase of fresh animals.

From the very contagious nature of the disease, and the great mortality caused by it, curative treatment is not to be recommended, for during the whole time an affected animal is kept alive it is an active centre of contagion. All our efforts must be directed to prevention, with a view to which the slaughter of diseased animals, isolation of suspected ones, careful observation of all that may have been within reach of the contagion, and the free use of disinfectants, are the measures on which the greatest reliance can be placed.

XI.—*The Outbreak of Cattle-Plague.*

At a Monthly Council held on Wednesday, February 7th, the Society's Veterinary Inspector, Mr. Duguid, laid before the Veterinary Committee the following Report on the recent outbreak of the cattle plague:—

"For some time previous to the arrival in this country of a cargo of animals suffering from cattle-plague, Germany had been what is termed a scheduled country under the Contagious Diseases (Animals) Act, and cattle coming from German ports could only be landed at the respective defined parts of the following ports:—Glasgow, Goole, Grimsby, Hartlepool, Hull, Littlehampton, London, Middlesborough, Newcastle-upon-Tyne, Plymouth, Shields (North), Southampton, Sunderland, where they were to be slaughtered.

"The first of the recent outbreaks of cattle-plague in Germany was on the Polish frontier in Upper Silesia. On the 13th January, cattle-plague was discovered at Hamburg, said to have been brought there by infected cattle *viâ* Berlin. On the 12th January, a cargo of forty cattle, already infected, had been shipped for Deptford, and arrived there on the 15th. One had died during the passage, and more died soon after their arrival.

"The Veterinary Department of the Privy Council, previous to the arrival of these animals, had warned the port inspectors to keep careful watch over all importations of German cattle, and at Deptford the inspector detected the disease, and communicated the fact at once to the chief inspector of the department.

"An Order was passed by the Lords of the Council, and published in a supplement of the 'London Gazette' of January 16th, by which sheep and goats imported from Germany were placed under the restrictions which previously only applied to cattle.

"In a letter to the 'Times,' dated Hamburg, January 15th, it was stated that 'on Saturday, January 13th, a train of about 100 oxen arrived from Goslar, in the Hartz mountains, for shipment to London. The beasts were found ill by the town veterinary inspector, and on the 14th rinderpest of an aggravated form broke out among them, so it is said. They have all been killed and the carcasses destroyed. The street in which the stable they were kept in was situated, has been cut off from all communication, and a cordon of soldiers placed to guard it.'

"A Reuter's telegram, dated Berlin, January 17th (evening), says:—'The "Official Gazette" announces an outbreak of cattle-plague on the property belonging to the Concordia sugar refinery, near Brieg, in the province of Silesia.'

"On account of the further extension of the disease in Germany, and the possibility that infected cattle might be passed hitherwards through Belgium and France, an Order in Council was passed and published on the 19th January, whereby those countries were placed under the same regulations as Germany; the Governments of Denmark and the Netherlands being at the same time informed that those countries would be brought under the provisions of the Act, unless they prohibited the importation and transit of animals from Germany. Subsequently it was considered necessary to make the regulation apply to both Denmark and Holland.

"As soon as cattle-plague was detected in the cargo of animals that arrived at Deptford on the 15th January, they were isolated, and locked in one detached block of buildings, where no one could enter or leave without the sanction of the market superintendent. A wide roadway separated this from any other portion of the market, in addition to which quantities of quicklime were placed at the different doors, so that anyone entering or leaving the premises must walk through it. On the following day the work of slaughter and the destruction of the carcasses was commenced. Special men were told off for the purpose, and not allowed to leave the building without changing their clothes; and a fumigator was at work disinfecting the clothes they had worn while at work. The mode of destroying the carcasses adopted was to quarter them and subject them to the prolonged action of steam in a large iron cylinder, until very little of the carcass remained.

"On visiting the market on January 18th, I considered, from the precautions taken, that there was no chance of the malady spreading, and that, as had been the case before, in 1872, when cattle affected with rinderpest were landed at Deptford, the contagion never spread beyond the market. In the present instance we have been more unfortunate, and cattle-plague now exists among dairy-cows in the Limehouse district.

"The District Inspector, being informed by a dairyman of the existence of a rapidly spreading disease among his cows, found, on visiting the place, that a number of them were suffering from cattle-plague, and communicated the fact to the Veterinary Department of the Privy Council. The whole of the animals were at once slaughtered, and the destruction of the carcasses commenced.

"An Order in Council was issued, and came into operation on February 1st, prohibiting the movement from the metropolis of cattle, sheep, and goats. A circular letter was also sent advising the local authorities of the fact, at the same time recommending that none but the most efficient inspectors be employed at the present crisis.

"The supplement to the 'London Gazette' of Friday, February 2nd, contained a further Order in Council, to take effect on the 4th, prohibiting the holding of all markets or sales of cattle, sheep, and goats within the metropolis, except as follows:—

"1. 'Cattle, sheep, or goats belonging to the owner or occupier of premises not in an infected place may be sold on those premises if they are not affected with cattle-plague, and have been on those premises not less than twenty-eight days previous to sale.

"2. 'Markets and sales may be held under the license of the Privy Council.'

"The Order also enjoins that cattle, sheep, or goats exposed for sale in a market, the holding of which for the sale of cattle, sheep, and goats for immediate slaughter is licensed by the Privy Council, may be kept alive for a period of ten days, and no longer, and that the owner, consignee, or other person exposing in a licensed market cattle, sheep, or goats shall, at his own expense, mark them as follows:—Cattle, by clipping the hair off at the end of the tail, and by clipping a broad arrow, about five inches long, on the left quarter. Sheep and goats, by clipping a broad arrow on the forehead.

"Up to the evening of February 5th, the disease had appeared in five dairies in the Limehouse district, but no cases had appeared in the Metropolitan Cattle Market."

Professor BROWN also stated that, on January 16th, thirty-nine animals had arrived from Hamburg in the 'Castor,' and were landed at the Deptford foreign cattle market, a place which was particularly adapted for its purpose, viz., for the reception and slaughter, within its limits, of cattle arriving from scheduled foreign countries. No difficulty was experienced there in dealing with these cattle. Those that did not die with the disease were killed, and all the carcasses were put in iron digesters, and subjected to steam at a temperature of 400°; and there was every reason to believe that the disease would not extend beyond the confines of the place in which these cattle had been received. However, on January 29th, a disease of a suspicious nature was discovered in a dairy at Limehouse, and when he inspected the animals on Wednesday, 31st, at noon, he had no doubt that this was an outbreak of cattle-plague. In less than four hours from the fact being established, an Order was issued by the Government, prohibiting the movement of cattle and sheep out of the metropolis. Since then, up to last night (February 6th), cattle-plague had manifested itself in seven other dairies all within a limited district, bounded by the Limehouse canal, the river Thames, and the river Lea; and therefore, in fact, forming a kind of island. Since the order just mentioned was issued others have been enacted, with a view of stopping sales in the various lairs and markets of the metropolis, except by special licence. The metropolitan market at Islington, and the Deptford foreign market have been licensed for the purpose of such sales, and it is not contemplated at present to license any other places for the sale of sheep or cattle within the metropolitan area. All animals sold at the metropolitan market will be marked for immediate slaughter, and all animals landed at Deptford are slaughtered within the limits of the market. The Government had received the usual complaints from persons interested in the trade; but they had firmly determined not to allow of any relaxation of the regulations which they had found it necessary to impose, with a view of preventing the spread of cattle-plague into the country.

With reference to the remark in the circular which had lately been issued by the Privy Council—that there was reason to fear that some infected animals had gone from London into the country—the suspicion which he had when the circular was drawn up had not been confirmed. The principle on which he acted was, that the slightest rumour required to be considered, judging from the facts relating to the last outbreak, when the plague had been six weeks in the East Riding of Yorkshire before its existence became known. As regards this outbreak, he, on learning the existence of cattle-plague in Germany, immediately telegraphed to every inspector on the coast, and that action contributed to the immediate detection of the disease at Deptford market. Soon afterwards he ascertained that some animals had been removed from a shed in the metropolitan area, whereupon he sent to every inspector in the country. However, the man from whose shed these cattle had gone had no trace of disease on his premises; and it appeared that they were fat cattle sent, *bonâ fide*, in the ordinary course of trade.

He wished to suggest to the Council that, although under these circumstances the alarm may be false, it is far better to give it than that ignorance of the existence of the disease should continue for a moment. He trusted that farmers would be cautious not to get manure from the metropolitan district. Some manure from Limehouse had, he had ascertained, been sent to the neighbourhood of Barking Creek, but the manure had been found, and steps had been taken that it should not be removed, and that it should be so dealt with as to provide against any danger arising from it. He proposed still to go on with the system which had been inaugurated, and to give every information possible to the public through the local authorities.

According to the existing law all animals from scheduled countries are now slaughtered at the port of landing, but the existence of cattle-plague at Limehouse proved that this is not sufficient to prevent the escape of disease from the defined part of the port. He had obtained from the master of the 'Castor' the certificate of the Government Inspector, dated January 12th, certifying that the particular animals which arrived here infected with cattle-plague were free from disease when inspected, although at that very moment some of them must have been dying of rinderpest. One of them actually died on the passage, and twenty-seven out of the remaining thirty-nine died at Deptford before the slaughtermen could do their work. He had ascertained that some animals from the same man's stables, at Hamburg, including some sheep, had been landed at Hull, but as foot-and-mouth disease had broken out amongst the sheep, they were all slaughtered, as well as the cattle; and all but two of the cattle sold that day in the English cattle-market had likewise been slaughtered in Hull. Those two went to the neighbourhood of Wakefield, but no trace of disease had been ascertained to exist in that neighbourhood, notwithstanding most careful inquiries.

The ship that brought the diseased animals to Deptford, went from there to the wharf belonging to her owners. Afterwards, when the cattle-plague had been discovered, the Veterinary Department caused the vessel to be disinfected under the inspection of one of their own officers. The Department had no power to prevent the ship from being immediately used again for the carrying of cattle, but the owners had voluntarily guaranteed not to use it for that purpose for another month. One difficulty, no doubt, is that a ship, after landing an infected cargo, may go to another wharf, and the infection may be distributed by means of the manure of the animals as well as by the passengers and crew.

The Government had already prohibited the importation of live animals, and also of dead meat, from countries in which cattle-plague existed, or in which it may be likely to appear. If the Council asked the Lord President of the Privy Council to prohibit importation from all foreign countries, he was quite sure that the Council would meet with a negative reply. The subject was a very large one, and could not be adequately discussed in the short time at the disposal of the Council; but he might mention as an example that Denmark and Holland had in force the most stringent regulations in accordance with an international agreement, chiefly with a view to protect themselves. They do not allow any ruminating animal whatever to pass their frontiers, either dead or alive, and not even a cat or a dog can go into those countries without being first disinfected. Therefore, there seems no reason why importation from such countries should be prohibited, and the prohibition of foreign importation as a whole is quite impossible. With regard to Belgium and Germany, that prohibition has already been made, and not only live cattle, but also flesh, hides, hoofs, hay, and other articles, are prohibited from being landed in England, while the Custom-house officers will not even allow the importation of bones from the countries mentioned. If an outbreak of cattle-plague should occur in any of the countries not already scheduled, our consuls are on the alert, and immediate information would be forwarded, and the Government would then prohibit all importation from such countries.

At a Special Council, held on Tuesday, February 20th, Professor **Brown** said that since the last meeting of the Council of the Society there had been several cases of cattle-plague in different sheds in the metropolis, and two cases outside. The metropolitan area being bounded only by an imaginary line, it was not very remarkable that the disease should have spread just outside. It had, however, only appeared about a mile and a half beyond the area. Another case had been reported that morning in Stepney, within the metropolitan district, but, so far as he knew at present, the disease had not extended beyond a radius of two miles. The most important matter, however, to be brought before the Committee was the outbreak in Hull, and in reference to this particular subject he wished to correct a paragraph in the report which had appeared of his remarks at the last meeting of the Council. In reference to the cargo landed at Hull on January 12th from the 'Leopard,' he stated that the animals had come, it was believed, from the same sheds in Hamburg as the diseased cattle which were landed at Deptford a few days afterwards. He remarked at the same time that in consequence of this fact the inspector at Hull was cautioned, and an inspector was sent from the Veterinary Department to warn the authorities, and to ask them to make an investigation as to the sanitary condition of the stock in the town and neighbourhood. This, he had been informed, was done. He also stated that he had taken measures to ascertain the destination of the animals sold in the Hull market for English cattle on the following Monday, and that all these animals had been accounted for excepting two, which had been sent to Wakefield, and which, as he then stated, were undoubtedly in a healthy condition, or an outbreak would have taken place long ago. But it seemed that this statement had been interpreted to mean that two of the thirty-nine cattle had been smuggled out of the defined part of the port at Hull, and sent to Wakefield. But the fact was that of the thirty-nine cattle in question several had foot-and-mouth disease, as also had the sheep landed with them, and consequently the sheep as well as the cattle were slaughtered within the defined part of the port. The only other cargo which arrived at Hull from Hamburg consisted of twenty-five cattle and thirty-seven sheep, all of which had foot-and-mouth disease, and in this case also both cattle and sheep were slaughtered, so that there was nothing to apprehend then, nor was there now, from these animals. In the year 1872 disease was introduced in some way to the Hull market from a cargo of Russian cattle which were not landed at all. Yet, notwithstanding all the precautions taken, and notwithstanding the fact that cattle were not brought to the shore, three animals which were bought in the Hull English cattle-market on the following Monday took the cattle-plague into three districts of the East Riding of Yorkshire. It was this fact which led him to make the inquiries just mentioned. It now appeared that from some cause or other cattle-plague had appeared in one instance in a Hull dairy situated in Hill Street. It had been ascertained that six animals were suffering from disease on Sunday last, and two others were attacked on Monday. All these had been slaughtered. It had also been discovered that a neighbouring dairyman had got rid of his stock. He stated that he had sent them to the butcher, but declined to give a reason for doing so. The presumption naturally was that he had some disease among his cattle or he would not have got rid of them, and if this was the case one might conclude that the disease was cattle-plague. If, as he had said, he sent them to the butcher, no danger was to be feared from that source, but if on the other hand he sent them into the Hull market, of course it was impossible to say how far the disease might by this time have penetrated.—Professor Brown then went on to say that he believed the object of the Council was to recommend to stock-owners and the local authorities all over the country the importance of instituting inquiries in their different districts as to the sanitary condition of their live stock. This appeared to him particularly necessary in boroughs. In the open country, where disease occurred, if a farmer sent away his cattle his neighbours immediately noticed it; but no particular attention was attracted by cows being driven from a dairyman's premises, as this was a common occurrence. Therefore, it was most important to ascertain the condition of animals in the dairies in large towns. This point was recommended particularly to the notice of local authorities in the circulars issued from the Veterinary Department some weeks since, but from what had taken place he was compelled to believe that the intention of these circulars had been misapprehended. Some of the local authorities had made regulations, copies of which had been forwarded to the Veterinary Department. They were nearly all based on the presumption that if cattle-plague existed in the district, arrangements should be made to meet it; but the object of the circulars sent by the Department was to induce the authorities to ascertain if disease existed, and to take steps to meet it before any serious outbreak occurred. The great danger was that disease might be distributed all over the country before any one knew anything about it. The object of the circulars was to induce local authorities to make strict inquiries, in order to ascertain the condition of stock in all the towns and in all the farms in the country. There could be no difficulty in doing this, if the local authorities put into motion the machinery in their hands. The Veterinary Department had no such machinery. As it was, however, they had pressed into the service a number of travelling inspectors, whose business lay in quite another direction, and the inquiries made by them had led to valuable results; indeed, without them the Department would have failed to obtain much important information. It was quite evident that all Acts in this country were passed with the intention of their being carried into effect by the various local authorities. He thought he was right in saying that there are nearly two thousand inspectors in different parts of the country. All these inspectors could be set in action by the simple direction of the local authorities, and it would be quite possible within a week to get a complete knowledge of the state of stock all over the country. But if the local authorities simply contented themselves with making regulations for use as soon as cattle-plague was discovered, the probability was that the disease would not be detected in time to prevent its rapid extension.

The local authorities in the infected districts had taken steps at once to stop fairs and markets, and to prohibit the movement of cattle. With regard to Hull, he might mention that on

Monday the inspector of the Veterinary Department suggested to the local authorities that all the cattle sold in the English market there should be killed within the limits of the town. The authorities, therefore, had them marked for slaughter, and moved into the defined part of the port used for the reception of foreign cattle from scheduled countries, and within the limits of that part these cattle must be slaughtered within ten days. They had also sent an inspector to every dairy in the town; this might have been done three or four weeks ago, when they were first made aware of the danger. It would be possible for the Privy Council to stop all movement of cattle in the East Riding of Yorkshire, as they did in 1872, and if the local authorities did not exercise the powers possessed by them for this purpose it might be necessary for the Privy Council to step in. But it would be rash to stop the cattle trade all over the country because rinderpest exists in two districts. Uniform measures cannot be applied to the whole country without harshness, and without producing grave inconvenience; and Professor Brown instanced the case of fairs and markets in Cornwall being prohibited on account of cattle-plague in Yorkshire and Essex.

At present, the only countries from which animals can come into the interior of England are Spain, Portugal, Denmark, Sweden, Norway, United States, Canada, and the Channel Islands. No cattle-plague had ever existed in those countries, and the inspection of cattle which arrived from them could scarcely be more rigid than it is. If the authorities had known beforehand that the cattle which arrived in the 'Castor' from Hamburg were infected with cattle-plague, they would have taken precautions accordingly, and would not have allowed them to land. As regards the consuls at the Continental ports, they were, of course, dependent for their information upon the authorities of the several countries, and the inspector appointed by foreign Governments is employed to see that no animal is shipped for exportation unless it is free from disease.

Lord VERNON moved the following Resolution:—

"That the president of this society be instructed to present a memorial to the Lord President of the Privy Council, urging upon the Government the necessity for calling upon each local authority to inspect constantly every market and dairy within their districts, in order to report upon the condition of the stock in their districts at once, and as often as the Privy Council may require.

Lord ESLINGTON having seconded Lord Vernon's Motion, it was carried unanimously.

The following Resolutions were then unanimously adopted:—

Mr. BOOTH moved, and Mr. LEEDS seconded:

"That the Government be urged to put in force the power vested in them by the 75th section of the Contagious Diseases (Animals) Act, and to stop all markets and fairs within Essex and the East Riding of Yorkshire, and the city of York."

Mr. **WELLS** moved, and Major **PICTON TURBERVILL** seconded:

"That the attention of the Privy Council be called to the fact that, whatever may be the power of preventing the disembarkation of animals arriving from foreign countries, no power appears to exist for preventing or controlling the disembarkation of passengers, drovers, or the crew, or of goods other than cattle, from vessels arriving with diseased animals on board, or for controlling for a limited time the movements of such vessels."

Lord **VERNON** moved, and Mr. **WELLS** seconded:

"That the Society's veterinary inspector, Mr. Duguid, be instructed to communicate with the Veterinary Department of the Privy Council, and to place his services at the disposal of the Department in the event of their being required."

Mr. **TORR**, M.P., moved and Mr. **WAKEFIELD** seconded:

"That the following noblemen and gentlemen be appointed a Cattle-Plague Sub-Committee, to act in case of emergency, and to decide upon calling another special meeting of the Council: The President, Lord Eslington, M.P., Mr. Brandreth Gibbs, Mr. Torr, M.P., Mr. M. White Ridley, M.P., the Hon. W. Egerton, M.P., and Mr. Wells."

It was further resolved that the President and Secretary should personally convey these resolutions to the Lord President of the Privy Council the same afternoon.

At the Monthly Council held on Wednesday, March 7th, the Cattle-Plague Committee, in their Report, expressed their satisfaction at the prompt and energetic action of the Privy Council in stopping the fairs and markets in the East Riding of Yorkshire, especially the great York Market, which would otherwise have been held on February 22nd. They learnt also with satisfaction that the President of the Council had stopped all fairs and markets in Lincolnshire; that no fresh cases had occurred in the metropolis since the previous week, or in Hull since February 27th. Mr. Duguid reported that he had visited Chelmsford to inspect some animals stated to have died from cattle-plague, but he found that the disease was splenic apoplexy, and that proper measures to restrict the progress of the outbreak had already been adopted. This report having been adopted, the Chairman added that subsequently to the meeting of the Committee the following notice had appeared in the 'London Gazette' of Tuesday night:—"Since the notice in the 'London Gazette' of February 27th last, cattle-plague has been detected in a dairy at Bow, and in a dairy at Hackney, both within the metropolis; also in a dairy at Hull, Yorkshire."

Mr. **RIDLEY**, M.P., asked the date of these last outbreaks of cattle-plague, as they were not stated in the 'London Gazette,' and he thought the Council might fairly ask the Privy Council to publish in future the dates of such outbreaks.

Mr. **Bowen Jones** then moved the following Resolutions, of which he had given notice:—

> "That a memorial be presented by this Council to the Government, calling attention to the insufficiency of the present regulations for the prevention of the introduction and spread of contagious diseases in cattle, and urging upon it the necessity of insisting—
>
> "1st. That any live animals imported into this country for food shall be slaughtered at the ports of debarkation.
>
> "2nd. That to prevent the exclusion of valuable store stock, such stock may be imported under licence and subject to quarantine at certain ports, which shall be set apart for the purpose.
>
> "3rd. That uniform and compulsory measures shall be enforced throughout the kingdom for the suppression of contagious diseases in cattle."

He had thought it better to bring these resolutions before the Monthly Council rather than before the special Council which had been so wisely called to meet on the 20th of last month, because they applied more to general policy than to the specific outbreak of cattle-plague which that special Council had been called upon to deal with. The first resolution did not entirely embody his own views, but he had been given to understand that he might receive more support from other members of the Council by advocating the slaughter of cattle at the ports of debarkation instead of the ports of embarkation. Amongst other arguments against the more stringent measure, he had been informed that in some localities—such as the east end of London—the employment of a large portion of the population, and the supply of food to a still greater number of the working classes, was dependent on the foreign cattle trade. He could understand that a responsible minister would desire to avoid such an organised opposition as might take place in the event of his making a proposition to slaughter all foreign cattle on the other side of the water, but this Society ought not to consider the matter in that way. He regarded his first resolution as simply a means to an end; and if the Society would be unanimous in going further, he would be quite prepared to modify his Resolution accordingly. It might be urged that the Government had already gone farther than his Resolution contemplated, and if it were passed it would be asking them to limit their present powers, although they are not now sufficient to keep the disease out of the country. He did not wish to limit the present powers of the Government, but he thought there was greater probability of cattle-plague being introduced into the country under the existing system, as it was carried out under ordinary circumstances, than if all fat cattle were slaughtered at the port of landing. Up to January 16th sheep and goats from Germany could be landed in England, and if found healthy, after twelve hours' detention, could go into all parts of the country, with the danger of carrying the infection with them. He felt that there were other diseases of stock to be taken into account besides cattle-plague, and that with regard to pleuro-pneumonia and foot-and-mouth disease, the slaughter of animals at the port of landing would cut off the great source of infection. The detention of twelve hours' duration was often insufficient to enable disease recently engendered to be detected at the port of landing, and therefore both the farmers and the consuming public suffer immensely from the diseases thus imported into English flocks and herds. If his Resolution were carried, the officers of the veterinary department would have more time to attend to the home flocks and herds, and the diseases to which they are naturally subject. Mr. Bowen Jones then gave some calculations as to the loss which had arisen during the great outbreak of cattle-plague in 1865 to 1867, as compared with that caused at each recurring outbreak of foot-and-mouth disease. The estimates of the latter might, however, be greatly increased by taking into account the loss of calves by death and abortion, and the loss of health and physique throughout the cattle of the country. With regard to the second Resolution, he felt that quarantine involved a difficult question, but that as sometimes valuable animals were sent out of the country temporarily, and would be wanted back again, while a few are from time to time imported, it would be desirable that such quarantine grounds as those at Southampton should be established for such cattle at the several ports of import. He believed that the Southampton quarantine grounds had worked well, and that any one likely to import a valuable animal and submit it to a month's quarantine, would take care that it was itself healthy previous to shipment, and that it was kept with healthy cattle on the journey to England. On the third Resolution, as to greater uniformity of internal measures, he stated that the great fault in the Contagious Diseases (Animals) Act, 1869, was its permissive character, which had caused, and always will cause, varying action by different local authorities. Stock owners would be willing to submit to restrictions if foreign diseases could be kept out of the country, but hitherto the Act had not been loyally carried out. The Privy Council already possessed under the Act enormous powers, but they will not exercise them, except when great alarm has been produced. As a rule he did not believe in centralisation, but the question of cattle-disease is of such enormous importance, that uniformity is necessary, and no uniformity can be obtained without compulsion. After the passing of compulsory measures, the uniformity required could be secured by the appointment of a number of inspectors to see that these compulsory orders were carried out, and to recommend further measures in case of necessity.

Mr. HEMSLEY having seconded Mr. Bowen Jones's resolutions,

Mr. JACOB WILSON referred to what had taken place at the last Council meeting. He reminded the Council that the Resolutions then proposed by Mr. Bowen Jones were withdrawn partly that the Council might be enabled to go to the Government with an undivided front, and partly in the hope that the regulations made by the Privy Council would prevent any further outbreak of cattle-plague. This hope had not been fulfilled; and the general opinion in the country now was that nothing short of total prohibition would meet the case. Special attention was being directed in every district to the outbreak of cattle-plague which was now threatening us, and it appeared that a cargo consisting of diseased cattle, and various merchandise, together with passengers and crew, might carry contagion all over the country, owing to the laxity of inspection in foreign countries. But even good inspection was not always sufficient to stop the importation of disease, and stronger measures than those now in existence were necessary for the protection of English herds. He would draw the line at the European ports, as at present they were quite helpless with no stronger protection than slaughter at the ports of debarkation in England. He regarded the "following" policy of the Government, instead of the "leading" policy which they should adopt, as a mistake; but he recognised the prompt action of the Privy Council at the first-outbreak of the disease, although it had not been successful. This matter was beyond the range of politics, and affected the consumer as much as the producer, the rinderpest having been the chief cause of the high price of meat in recent years. The Americans had now settled the problem of feeding the people by the extension of the dead-meat trade, but he would be prepared to exclude even dead meat, if it were likely to bring with it cattle-disease. The internal regulations which they had to submit to were harassing, and not always effective, besides being often evaded. Quarantine places he regarded as impracticable, because in the case of three or four cargoes of animals arriving within a short time, the healthy animals must of necessity walk over the same ground as the diseased cargoes. Therefore he would draw the line of prohibition a little further off than it is at present, and insist upon animals being slaughtered on the other side of the water. He had been told that no Government could possibly pass such an order; but if not, then he hoped some independent member would rise in the House of

Commons, and move a Resolution to the same effect as his Amendment. But to-day he asked the Council for an unfettered expression of their opinion upon it. He, therefore, moved as an Amendment, in place of the first and second Resolutions, and the preamble of Mr. Jones's motion, the following:—

> "That seeing the precautions hitherto adopted for the prevention of outbreaks of rinderpest and other contagious diseases of animals in Great Britain have not been successful, it is the opinion of this Council that nothing short of the total prohibition of the importation of live stock from European ports will meet the exigencies of the case."

In reply to Mr. Wells as to the statement in Tuesday night's 'Gazette,'

Professor **Brown** stated that the outbreak of cattle-plague at Hull was one of four which had occurred in the infected district, and the disease had not extended beyond that area. The last case in Hull had occurred on February 27th. In the metropolitan area a case had occurred at Hackney on March 3rd; and in Essex there was another case on March 4th. Up to the present time 138 animals, healthy and diseased, had been slaughtered from either being affected with cattle-plague or having been in contact with diseased animals; but generally only one or two animals in a dairy had been attacked, and the rest were immediately slaughtered. The disease had not spread to any important extent beyond the area of the first outbreak in each case. The Hull outbreak had nothing to do with that in the metropolis. On January 12th and 14th, two cargoes of animals were landed at Hull from the same sheds in Hamburg which had housed the infected animals that had been sent to Deptford, and one cargo left Hamburg on the same day and within a few hours of the "Castor," and would have arrived in Hull simultaneously with the "Castor's" arrival at Deptford, but that the "Castor" lay off Gravesend all Sunday night. The officials at Hamburg declared the existence of cattle-plague on the day after the infected cattle left that port, and they not only killed all the animals, but burnt down some of the buildings in which the animals had been kept, as the best means of disinfecting them. It now appeared that soon after the arrival of one of the cargoes at Hull, one animal presented peculiar symptoms, from the description of which, and from the *post mortem* examination by the inspector, taken in connection with the other evidence, Professor Brown had no hesitation in pronouncing the disease to have been cattle-plague. The disease had thus reached the dairies in Hull, as in 1872 it reached the farms in the East Riding of Yorkshire from Russian animals which had never been landed. In each case, persons employed about the animals must have carried the infection.

The disease had lingered in the original areas of infection, but the area had not at present been materially extended. All the authorities are now quite alive to the danger, and many of them have imposed restrictions on the cattle traffic. If absolute powers were possessed by the English Government, such as exist in Germany, a cordon might have been drawn round the centre of infection, and the animals slaughtered immediately or kept within very limited bounds. Under such a system Hamburg, Berlin, and Breslau have been already declared free of cattle-plague, but it still lingers in Saxony; and Professor Müller, the state veterinary surgeon in Berlin, had come to the conclusion that the lesson to be derived from this recent outbreak was, that all cattle-markets in large towns in Germany ought to be closed as soon as a declaration of cattle-plague was made at any place on the frontier.

Colonel KINGSCOTE seconded Mr. Wilson's Amendment. Professor Brown had shown conclusively how difficult it was to eradicate the disease when once it appeared, and it occurred to him that if the 'Castor' had pursued her course, instead of lying off Gravesend all night, the disease might have got much farther into the country before it was discovered, than it had done under the actual circumstances. He regarded Mr. Bowen Jones's Resolution as not going far enough, and, in his opinion, all animals ought to be slaughtered at the port of embarkation, or at least the import of all live animals should be prohibited.

Mr. BOWLY never felt so much the responsibility of his position as a member of the Council. The whole of the agricultural interest throughout the country were now looking to this Council to take action in reference to this outbreak of cattle-plague; and, fortunately, the recent importation of American meat had shown that the prohibition of the importation of live stock would not be so great a hardship, either to Continental people or to consumers, as we had previously believed. He should, therefore, support Mr. Wilson's amendment.

Earl CATHCART expressed his obligations to Professor Brown for the lucid statement which he had made to the Council. His lordship did not intend to say anything upon the general question, but he would remark on the proposal to import nothing but dead meat, which, as Professor Brown had said, may also bring disease with it. He had studied the dead-meat market practically. The practical difficulty which he saw was that the poor were largely dependent upon the supply of offal for their animal food. This offal was perishable, and probably not worth carrying long distances. The Council should, therefore, look at all the circumstances surrounding the question, and the Government would certainly have to consider these circumstances before coming to any decision on such a Resolution as that before the Council.

The **President** remarked that the prohibition of the importation of live stock would affect a very large interest known as the fellmongers' trade, which was dependent upon the importation of hides, horns, and hoofs, and it would be a serious thing to destroy such an enormous industry.

Mr. **Charles Howard** cordially supported the Amendment. There was a very strong feeling in the Midland Counties, as well as in the North, that pressure ought to be put upon the Government in reference to the importation of foreign cattle. He trusted that the Council would pass a very firm Resolution, as, in his opinion, the breeders and feeders of cattle in England ought to be considered more than the consumers of foreign offal. The English farmers within the last few years had lost more money from foreign diseases than the worth of all the foreign cattle which had been imported in the same time; and the farmers were not now in a position to bear the burden of another outbreak of cattle-plague.

Professor **Brown** spoke a few words on the general question. It had been suggested that the importation of foreign cattle should not be permitted, as a temporary measure at least, the object being, presumably, either to limit the extent of the present outbreak, or to prevent the introduction of fresh centres of infection. The action already taken by the Privy Council had practically met these objects, as the importation of all animals from countries from which cattle-plague could come had been totally prohibited, while animals from some other countries must be slaughtered at the port of landing. The countries from which animals can still be imported, and pass into the interior of the country, have protected themselves from cattle-plague for at least a hundred years, in which, indeed, so far as is known, the cattle-plague of our time had never appeared. It had been apprehended that possibly cattle-plague may be imported into this country by sheep; but, as a matter of fact, this has never occurred, and it therefore would seem superfluous to provide for a contingency which had never yet arisen. Mr. Bowen Jones's Resolution, if put in force, would necessitate the re-modelling of the arrangements at all the landing-places in Great Britain, with, perhaps, the exception of Deptford, and would therefore have to be discussed and passed in the House of Commons before it could be adopted. If the English Government were to pass an Order such as had been suggested, it might fairly be alleged that England had broken faith with the Governments of those foreign countries which had agreed to all our proposals, and had made successful efforts to keep disease out of their territories.

In reply to Earl FEVERSHAM,

Professor BROWN stated that under the present regulations cattle cannot be moved from the borough of Hull into the East Riding of Yorkshire, but the authorities of the Riding cannot prevent cattle from Hull from passing through their district.

Mr. MARTIN had a vivid recollection of the appalling scenes which he had witnessed during the last great outbreak of cattle-plague, and many of the smaller farmers had never recovered from the losses which they then sustained. The only safety lay in slaughter. Nothing would satisfy agriculturists except the prohibition of the importation of live stock from foreign countries, and he wished the Government could be persuaded to adopt preventive means before cattle-plague appeared, instead of afterwards. With regard to the argument that fell-mongers and other trades might suffer, he stated that many trades had already been sacrificed for the good of the country, and especially instanced mail-coaches at the time of the introduction of railways.

Mr. AVELING referred to the horrible sufferings of animals which came across from the Continent in steamboats, and expressed the opinion that the flesh of such animals was not so wholesome as that of animals killed on the other side of the water.

Mr. STRATTON hoped that no temporary measure would be recommended, as the Privy Council had already made excellent regulations of that nature. He did not complain that they had heard too much about cattle-plague, but he did complain that they had heard too little about foot-and-mouth disease and pleuro-pneumonia; and he thought the Council had a right to ask the Government for protection for the farmers from both these diseases.

Mr. BOOTH recalled the statement made a month ago as to the limits of the outbreak of cattle-plague. He reminded the Council that these limits had since been exceeded, and the ultimate development of the outbreak could not be stated. During the last twelve years they had had three different outbreaks, and another might occur in three months' time. He thought, therefore, the Council ought to urge the Government to take the means proposed by the Amendment, to avoid such a contingency. Only 5 per cent. of our consumption of meat is imported from abroad as live stock, and 27 per cent. of these animals are slaughtered in consequence of forming part of diseased cargoes. Although we continue to admit stock from foreign countries, all foreign countries decline to take stock from us, as also do our colonies. Therefore, we should look to means for our own protection.

Mr. **Ridley**, M.P., in supporting the amendment, stated that he had come to his present opinion with considerable hesitation, as he was aware of the practical difficulties which surrounded the question. The Council of the Society were not legislators, and they must leave the Government to deal with the difficulties of the question. He hoped that the Council would be practically unanimous in the expression of their opinion that day, and that they would state their belief that prohibition of importation of live stock was the only means of preventing the importation of diseases of cattle. It might be desirable to make prohibition the rule, and to make exceptions with regard to certain countries, throwing upon them the *onus probandi* of their freedom from diseases; but he trusted that the Government would no longer let Continental countries assume that our ports were open to their stock. The slaughter at the port of landing of cattle, sheep, and swine, from Continental countries, had been proved insufficient to keep foreign diseases out of the country, and nobody had put this fact more powerfully before them than Professor Brown himself. He (Mr. Ridley) was more sanguine than some members of the Council that the cattle-plague would be restricted to its present dimensions, but the inconvenience and loss to which local authorities and farmers had already been put were enormous. In many counties local authorities had found it their duty to prohibit the movement of all animals in their districts, and the farmers had in consequence lost a great deal of money. The question therefore arose, Are they to be put to this loss and inconvenience because we hesitate to stop the importation of live stock from foreign countries? Such a measure would not interfere with the dead-meat trade. No doubt there are practical objections and difficulties, but he felt that the Council would fail in their duty if they did not pass Mr. Wilson's Amendment.

Mr. **Bowen Jones** said that all members of the Council have obviously the same object in view, and the only question was, the best means for its attainment. Their ultimate object, no doubt, was the establishment of a dead-meat trade, and he was willing to withdraw his first two Resolutions in favour of the Amendment.

After a few words from Mr. **Wells**, expressing his reluctance to prohibit the importation of store stock,

Mr. Wilson's Resolution was put to the vote and carried unanimously.

The third Resolution of Mr. Bowen Jones was also carried unanimously, viz.:—

"That uniform and compulsory measures be enforced throughout the kingdom for the suppression of contagious diseases of cattle."

It was then moved by Colonel KINGSCOTE, seconded by Mr. JACOB WILSON, and carried unanimously:—

"That the foregoing Resolutions be conveyed to the Lord President of the Privy Council."

At a meeting of the Cattle-Plague Sub-Committee on Friday, March 16th, 1877, the following document was ordered to be sent to each member of the Society; also to the clerk of each local authority, and the secretary of every agricultural society in England, accompanied by the subjoined circular:—

"The Cattle-Plague Committee of the Royal Agricultural Society of England strongly recommend owners of stock to adopt the following precautionary measures, with a view to prevent the introduction of cattle-plague poison to their farms and other premises:—

"1. Avoid purchasing fresh stock as much as possible.

"2. Keep newly-purchased animals separate for three weeks.

"3. Keep your stock away from public roads.

"4. Prevent strangers — especially butchers, drovers, and jobbers—from going near your animals.

"5. Employ no strange labourers.

"6. Be careful of the movements of your own labourers, especially do not allow them to visit other farms or premises.

"7. Tie up your own dogs, and keep off strange dogs.

"8. Be careful as to sources of fodder of all kinds.

"9. Avoid buying fresh manure.

"10. Prevent the entry of strange carts.

"11. If cattle-plague should appear in your neighbourhood, put down fresh lime at all gateways and approaches.

"The committee also recommend the adoption of the following measures, in order to detect the first signs of the disease, and to ascertain its nature:—

"1. Keep a careful watch over all your stock.

"2. Separate animals showing any signs of illness from the rest.

"3. Prevent men going from suspected to healthy animals.

"4. Prevent the same buckets, brooms, &c., being used for suspected and healthy animals.

"5. Send for a veterinary surgeon.

"In the event of the disease proving to be cattle-plague, the veterinary surgeon will act immediately according to law.

"By order of the Committee,
"H. M. JENKINS, Secretary."

[COPY OF CIRCULAR.]

"SIR,—I am directed by the Cattle-Plague Committee of the Royal Agricultural Society of England to forward you a copy of the recommendations which they have issued to the members of the Society, with a view to prevent the spread of cattle-plague, and in order to ensure its detection as early as possible.

"I am to request that you will cause this document to be reprinted, and circulated as extensively as possible.

"I am, sir, your obedient servant,
"H. M. JENKINS, Secretary."

At a Monthly Council held on April 11th, Professor Brown reported that since the last meeting of the Council twelve outbreaks of cattle-plague had been reported from different parts of the country. On the day of the meeting, cattle-plague was detected in a dairy of 11 cows in North Street, Hull. All the animals were slaughtered without delay, and the local authorities declared a certain district round the premises an infected place.

On March 8th an outbreak occurred in a herd of 24 cattle on a farm at Beelsby, near Grimsby, Lincolnshire. The inquiry which was instituted did not result in establishing any connection between this outbreak and the centres of infection at Hull, but it can scarcely be doubted that the cattle-plague poison was in some indirect way, by the agency of persons or things which had been in contact with the diseased cattle, conveyed from Hull to Lincolnshire. The statement which was made that the outbreak was due to the introduction of bones from Germany is entirely without foundation. The only bones which had been brought to the premises were part of a lot which had been on the wharf at Grimsby for several months, and they came originally from Amsterdam.

On March 12th an outbreak occurred in Stepney, in a large dairy of 123 cattle. The owner of these premises had suffered severely in the former outbreak of cattle-plague in the metropolis in 1865–6–7, and had consequently taken every possible precaution for his own protection, but without success. As soon as the disease was detected, measures were at once adopted for the purpose of arresting its spread; the premises were declared infected, the diseased cattle were slaughtered, and also all those that were on the premises.

On March 20th another outbreak occurred in a dairy of 35 cows in Whitechapel.

On March 22nd another outbreak occurred in North Street, Hull, in a dairy of 8 cows. These premises were within the infected place which had been previously declared by the local authority.

On March 26th another outbreak occurred in the metropolis, at a distance of something like seven miles from the centre of infection in the east of London. In this case the animals among which the cattle-plague appeared were in a shed in Goldhawk Road, Shepherd's Bush. All the animals, 31 in number, were slaughtered. No direct connection can be traced between this outbreak and the disease in the east of London, but it was stated at the time that a person who inoculates for pleuro-pneumonia had operated some time previously on a number of the animals, and the disease, when first detected, was confined to the animals which had been so inoculated. The operator denied having been in contact with diseased animals, and there was no positive evidence adduced in opposition to his statement.

On March 27th an outbreak occurred at Poplar among 16 cattle. On the same day another outbreak occurred in St. George's in the East, among 13 cattle.

On March 31st cattle-plague was detected in a cow-shed at Poplar, among 14 cattle.

On April 3rd another outbreak occurred in St. George's in the East, among 66 cattle. All the animals in one shed were slaughtered, but those in another shed on the same premises being, it was alleged, perfectly isolated, were allowed to live. It has just been reported that, to avert the risk of the extension of the disease, an order has been given for the slaughter of all those animals.

On April 7th an outbreak of cattle-plague at Willesden was reported to the Veterinary Department, and the Chief Inspector was immediately instructed to make an inquiry. On his arrival he found 15 animals suffering from the disease, many of them in the advanced stage. These animals were all slaughtered and buried the same evening. On the following day several other animals in the herd were found to be affected; and at a meeting of the local authority of Middlesex, on Monday, instructions were given for the slaughter of the entire herd. The carcasses of the healthy cattle will be removed, but the whole of the diseased animals, together with the hides and offal of the healthy cattle, will be buried on the farm. This outbreak of cattle-plague is presumably connected with the one which occurred at Shepherd's Bush on March 26th, but no direct communication between the two centres has been traced. In none of these cases can satisfactory evidence be obtained, as the persons who could give precise information prefer for obvious reasons to remain silent.

On April 7th an outbreak of cattle-plague occurred in a dairy of 10 cows at Shadwell.

A report was published on Tuesday (April 10th) relative to an outbreak of cattle-plague in Oxfordshire; but in reply to a telegram from the Veterinary Department, it was stated that there is no cattle-plague nor any other infectious disease known to exist in the locality referred to.

It may be remarked in reference to the spreading of the disease in the metropolis and its vicinity, that in no instance has an outbreak been traced to the movement of diseased or infected animals. The same thing was also observed in the outbreak in the metropolis in 1865. Occasionally, in answer to inquiries, a dairyman would state that he had purchased a cow in the metropolitan market a week before the outbreak occurred; but in far the majority of instances the disease must have arisen from "mediate contagion," *i.e.*, by the agency of persons or substances which had been in contact with diseased animals. In attempting to account for the extension of the disease, it is not unfair to lay considerable stress upon the utter indifference which owners of dairy stock manifest as to the risk which they incur by the neglect of the commonest precautions. By Section 59 of the Contagious Diseases (Animals) Act, they are empowered to forbid the entrance of persons into their premises without permission, whenever cattle-plague appears in a district of a local authority, but no instance is known of such prohibition having been enforced in any part of the district where cattle-plague has recently appeared. It has been publicly stated that men who have been in contact with diseased animals are allowed to leave premises without previous disinfection; and it is known that milk-cans, and other apparatus used about cattle, are moved from premises where the disease existed without previous disinfection. Vehicles which are employed for the purpose of conveying fodder or manure are quite likely to carry the infection of cattle-plague, but the owners of stock generally fail to recognise these sources of danger.

A very wide-spread belief appears to exist in that most unfortunate of all delusions, the atmospheric theory of contagion; and so long as stock-owners entertain the impression that the disease is "brought by the air," it is quite hopeless to expect that they will avail themselves of the means which they have at command for the protection of their animals. There cannot be a question that the contagion of cattle-plague is of so virulent a character that precautions which, in reference to other contagious diseases, might fairly be deemed superfluous, are indispensably necessary to prevent its distribution. Too much attention cannot be paid to the adoption of means for the early detection of the disease, and the immediate application of all precautionary measures. It has been remarked during the present outbreak that some of the characteristic symptoms, particularly those appearances of the mucous membrane of the mouth, which were so commonly observed in the former outbreaks, have been absent; owing to this circumstance, the inspectors have sometimes been unable to arrive at an immediate decision as to the nature of the disease. It is very desirable, however, that in any case of doubt communication should be at once made by telegram to the Veterinary Department, and the suspected animals should be as carefully isolated as though the existence of cattle-plague were a matter of certainty.

In reference to the action which has been taken by local authorities in districts where cattle-plague has appeared, it may be stated that in Essex, and also in Hull and in Lincolnshire, the disease appears to have been effectually arrested.

In the metropolis the Board of Works have recently made an order prohibiting the movement of cattle, except by licence, in that part of the metropolis north of the Thames. The City authorities have passed a similar order. Introduction of store cattle into the metropolis has been absolutely prohibited.

The Middlesex local authority have passed an order prohibiting fairs and markets and movement of cattle, except by licence, in the county.

The Cattle-Plague Committee recommended that Professor Brown's report on the cattle-plague be sent to the local authorities throughout the country. Considering the difficulties with which the local authorities have to contend in dealing with the continued and alarming outbreaks of cattle-plague in the metropolis and the county of Middlesex, it appeared to the Committee that the Government should itself take immediate action in the Home Counties, instead of leaving the necessary steps to be taken by the local authorities.

The following discussion then ensued :—

Mr. Jacob Wilson stated his opinion that agriculturists generally had no confidence in the ability of local authorities to cope with the danger which now threatened the stock-owners of the country. No doubt the local authorities as a rule endeavoured to do their duty as far as they knew how, but in many cases their inspectors had not sufficient knowledge to be able to pronounce decisively whether a particular case of disease was an outbreak of cattle-plague or not. Therefore, on the one hand, the local authorities often did not know what to do; and when they did know, they hesitated to do it at the right time; while it was to the interest of their inspectors, who had their own private business to attend to, that they should do as little as possible. He therefore hoped that not only this Council, but the agriculturists of England generally, would show a united desire that the Privy Council should take the matter into their own hands; and that they were quite satisfied it would then be done in the right way. They were not asking the Privy Council to do more than they had done during the outbreak in 1865. By declaring Middlesex an infected district he thought the requirements of the case would be met, so far as the Willesden outbreak is concerned. He should like, however, Professor Simonds to give an expression of his opinion on the subject.

Professor **Simonds** said there could be but one opinion with regard to the gravity of the present outbreak. When it was first ascertained that cattle-plague had appeared in England, it was hoped that as Deptford, where it first appeared, possessed special facilities for preventing the extension of the disease, it would not spread further. Unfortunately, however, it did spread, and it was a singular fact that the next outbreak took place on the north side of the Thames. This second outbreak had proved to be the chief focus of infection, from which the disease had spread, some of the outbreaks having taken place in the metropolis at a period of time which would lead one almost to suppose that the disease had been suppressed, showing clearly that some special cause for the spread of infection was in operation. The disease thus went on at uncertain intervals, and gained a footing in Essex; and now, unfortunately, had returned to Middlesex—outside the metropolis. There could be no doubt that the local authorities possess sufficient power, but it is not always sufficiently exercised. Looking at this outbreak as a whole, there was abundant evidence of that. The first infected place he himself visited was at Limehouse, and he there met an officer of the local authority, the Metropolitan Board of Works. He gave an opinion that the disease was undoubtedly cattle-plague; the Privy Council Inspector was also there at the time, but he (Professor Simonds) was requested to go down to confirm the inspector's opinion. There were then three cows lying dead in the place, one or two in a dying condition; and notwithstanding this, he was asked by the representative of the local authority whether the other animals might not be removed. That would serve to show the ideas entertained by individuals who have had little or no opportunity of becoming acquainted with this fatal disease; and he feared one might go farther, and say that some of the inspectors in different parts of the country are themselves insufficiently acquainted with the laws which govern the spread, or, in other words, with the causes which are in operation leading to the extension of the disease. As Professor Brown points out in his Report, in every instance we have had the disease communicated in some unknown manner. There is no clear evidence in any one of the present outbreaks, numerous as they have been, of the manner in which the disease has been conveyed from one centre to another. That is not surprising in view of the manner in which these cases are practically dealt with. For instance, if an outbreak takes place in a London dairy, the owner, in the first place, probably hesitates as to what may be the nature of the affection. He consequently gives no notice to the authorities. He waits a day or two; the disease progresses; he begins to think that his animals are suffering from cattle-plague, and he then sends to the market probably the whole of the animals, or a greater part of those, which in his judgment give no evidence of the disease. This has been done in past instances, and always will be done when an opportunity exists. There are a large number of persons who are cow-keepers, but the animals in their possession do not belong to them. They may be said to belong to cattle-contractors, who receive so much money for their hire. When any of the animals give an insufficient quantity of milk they are sent to the butcher, or removed by the contractor, and others put in their place. This system leads to drovers and other persons being continually about the premises, and going from one shed to another without reference as to whether the animals they have been among are healthy or otherwise. Then there are the butchers; and it is certain that there are butchers in London, as well as elsewhere, who are always ready to buy animals whether they are diseased or not, and it is a fact that the animals which have gone from the cattle-sheds where disease had appeared have been bought by these butchers. If he himself were to go to a place where disease exists, and brought not so much as a patch of dung on his boots away with him, if he went to another shed he would be certain to carry the infection. Thus it would be seen how absolutely necessary it was to have a controlling power, who would enforce the laws relating to cattle-plague; and in his opinion the local authorities were not sufficiently well acquainted with the precautions which it was necessary to take. Therefore we must have, he thought, in this country a "centralised power," and, of course, that "centralised power" must be the Government. It appeared to him to be absolutely necessary for another reason—viz. that we cannot isolate an infected place in the same manner that it is isolated on the Continent. The liberty of the subject here will not allow it. We have proof upon proof of the easiness with which cattle-plague can be got rid of where complete isolation is maintained, as on the Continent, clearly showing that the theory of contagion being conveyed in the air has no foundation whatever. On the Continent, when cattle-plague appears, a *cordon* is immediately drawn round the infected place, and not only is no individual allowed to go within it, but the cordon is kept up with the same severity for three weeks after killing the last animal. The Government kills all the animals on the place, and allows compensation to the owners. We cannot do that; we cannot isolate to the same extent. It is something remarkable the way in which isolation is carried out in Germany. If the disease occurs in a village, the church is closed, and no assemblage is allowed to take place under any circumstances. If a high road runs through the infected district, people are not allowed to pass along it unaccompanied with a guard. Indeed, to use a homely phrase, the place for the time being is, as it were, put out of existence. Finding, as we do, that the result of this system is that the cattle-plague is very easily got rid of, we must adopt a somewhat similar method; and it seemed to him that the right and proper thing to do was to take possession of all animals, whether healthy or diseased, in an infected place, and have them all killed at the outset, and every one of them buried, allowing no salvage at all. Let the whole expense of this be borne by the Government. If we were to adopt a strong measure like this with the first outbreak, it seemed to him that cattle-plague would at once be stamped out. It was the only direction they could safely go in if we would not witness a recurrence of things which took place in 1865. He knew that during the last great outbreak in one part of the country, which, however, he could not mention, a strong suspicion existed that cattle-plague was intentionally kept alive. He communicated his fears to the head of the Veterinary Department of the Privy Council, from whom he received instructions to act, as the chief inspector, and to go down and stamp out the disease. He went down and killed and buried one herd completely, allowing no salvage whatever. He repeated that dose three times, and the result was that the cattle-plague was at once and entirely stamped out of that district. This shows that where cattle-plague keeps going on as it is doing at the present time—and no one knows where it may ultimately travel to—it is absolutely necessary to deal in no half-measures, but to take prompt and decisive action.

Earl SPENCER thought the remarks of Professor Simonds were very valuable, and the more widely they were made known the better it would be for the country. With regard to the cattle-plague, we could not impress upon the public too much the insidious nature of the disease. He thought the resolution which the Committee had come to, and wished to press upon the Government, was very opportune, and should be adopted. Up to this time the Government have had a good deal to be said in favour of the view they took, that it was impossible to adopt uniform measures all over the country, as there were circumstances which made it difficult to pursue that course. But when we come to imminent danger, and have to deal with a smaller district, the case is different. He thought the cattle-plague could be controlled if complete isolation were carried out, and if the slaughter is also carried out vigorously. We should thus see, as in Hull and in Lincolnshire, the cattle-plague could be entirely got rid of. In Middlesex there is great difficulty in carrying out complete isolation, and a stronger hand is required than the local authority. The places where the cattle-plague now lurks are where it is the habit to herd a large number of cattle for milking purposes. He should like to know whether in the case of the outbreak at Willesden it is in a dairy where a large number of cows are herded?

Professor **Simonds**: It is a dairy.

Earl **Spencer**: It is in some way a consolation to think that the disease has not yet spread to where cattle are grazing out. From the high state in which herded cattle are fed they are more susceptible to disease than others. He had not with him a copy of the order just issued by the Middlesex magistrates, but he believed he was right in saying that it does not include sheep. No doubt Professor Simonds would bear him out in saying that on the occasion of the last great outbreak many sheep were affected with cattle-disease.

Professor **Simonds**: Some twenty-five counties in England and five in Scotland had sheep affected with the disease in 1866.

Earl **Spencer**: Sheep on the same farm with cattle also carried the disease in their fleeces, and in this way were a cause of danger. In making an order in Northamptonshire the other day it was not thought necessary to include sheep at that time, as cattle-plague had not appeared there, but he was thoroughly of opinion that if cattle-plague is actually within the boundaries of a district, the authorities are bound, for safety's sake, to include sheep. If the Middlesex magistrates have not included sheep, he regarded it as a great oversight on their part; but it would be an omission which might be overcome if the Government took a more active part. Before the Commission of 1865 a great deal of evidence was adduced on the subject of contagion, and he came then to the conclusion that cattle-plague was almost always conveyed by contagion; but he should be sorry to say that it is impossible that the air can carry particles of the contagium with it. He just mentioned this, because it was laid down very strongly in the Report that in hardly any case can it be carried by the air.

Mr. **Dent** hoped that, as the Council had on past occasions dealt with the matter generally, they would now deal with the Report of the Committee entirely. He was sure those members of the Committee who heard what Professor Brown said on the previous day with regard to the recklessness of drovers and butchers' men in going from dairy to dairy, must apprehend great danger from that cause. The Committee put the question to Professor Brown why such persons had not been prosecuted, and the reply was, that it is the duty of the local authority to institute such prosecutions. The Committee had come to the conclusion that in a large county like Middlesex, the local authority are not strong enough, and he hoped the Council would think also that in the Home Counties, at all events during the present outbreak, the Government should take the matter into their own hands, and strictly carry out the law.

The Hon. W. **Egerton**, M.P., supported the views of the Committee with regard to the Government taking upon themselves the responsibility of carrying out the orders in the Home Counties. This would, of course, involve very great expense, and possibly a fund would be required from Government; and he thought the Council should, at the proposed interview with the Lord President of the Privy Council, also urge upon his Grace to take all requisite steps to carry out the order. The Council had the strongest possible case to go before the Government, and ask them to make more stringent regulations with regard to the movement of human beings in cases of outbreaks of disease. It was of course a very difficult thing in this country to control the movements of individuals, but he thought it would be seen it is the only way in which foreign Governments have stamped out the disease, and we have now sufficient evidence to warrant us in adopting the same course. We may thus be saved from the great scourge which ten years ago cost his own county hundreds of thousands of pounds, whereas a few thousand pounds spent by the Government might free us from the plague. He begged to move

"That a deputation wait upon the Lord President of the Privy Council to lay before them the views of the Council."

Colonel KINGSCOTE, C.B., M.P., in supporting the views of the previous speakers, said it was with the greatest regret that the Council found themselves compelled to go on discussing this dreadful cattle-plague. No words of his could add to the gravity of the situation, for he certainly considered that the outbreak at Willesden was one of the gravest things which had happened for a long time. Only last evening he elicited from Lord Sandon, in the House of Commons, the fact that the owner of the diseased cattle at Willesden suspected an outbreak of the disease as early as the 3rd of April. The local inspector took three days to make up his mind, and the outbreak was not reported to the Privy Council until one o'clock on Saturday the 7th of April. Contagion may or may not have been spread to any part of England in consequence. Therefore, he thought it would be seen how important it was that the Government should take the matter into their own hands, even if an Act of Parliament should be required for the purpose. We are told that contagion is conveyed even by milk-cans. Then, again, cans are sent up from the country and back again, and are just as likely to carry the disease as anything else; even dogs and cats should be stopped from going in or out of an infected district. If Government did not take the matter in their own hands, he for one dreaded the consequences. Lord Sandon had given notice to move for a Committee to inquire into the outbreak; but what could a Committee tell us that we did not know already? If they wanted a Committee to tell us how it came here, that was another thing. He could not see that the Committee would do the slightest good in the world. What was the use of waiting until the Committee had reported, probably about the end of July? He had great pleasure in seconding the motion that a deputation wait upon the Duke of Richmond and Gordon.

Mr. RIDLEY, M.P., hoped that the Government did not intend by this Committee to shelve immediate action. He could imagine that there is some desire on the part of the Government to find a loophole with regard to the importation of live stock into this country; but what they had to impress upon them was to deal with a different subject altogether. He was sure that every gentleman present was agreed that, with regard to the Home Counties certainly, the Government ought to take the matter into their own hands. Let them submit to his Grace that while the Council welcomed the Committee in the hopes that it might do some good, they strongly urged the Government to supplement the action of the local authority. The deputation might supplement the report of the Committee by suggesting that sheep should be included in the order.

Mr. Egerton's motion was then unanimously agreed to.

On the motion of Colonel KINGSCOTE, the following noblemen and gentlemen were appointed to form the deputation:—Lord Skelmersdale (President); Sir A. K. Macdonald, Bart.; the Hon. W. Egerton, M.P.; Mr. Aylmer; Mr. Booth; Mr. Bowly; Mr. Dent; Mr. Brandreth Gibbs; Mr. Charles Howard; Colonel Kingscote, M.P.; Mr. Macintosh; Mr. Leeds; Mr.

Randall; Mr. Ridley, M.P.; Professor Simonds; Mr. Torr, M.P.; Mr. Wells; and Mr. Jacob Wilson.

This deputation had an interview with the Lord President of the Privy Council the same afternoon.

On April 12th the following Order was made by the Privy Council:—

"1. This Order shall take effect from and immediately after the fifteenth day of April, one thousand eight hundred and seventy-seven; and words in this Order have the same meaning as in The Animals Order of 1875.

"2. This Order extends to the City of London and Metropolitan Police District only.

"3. Every person having in his possession or under his charge an animal affected with cattle-plague, or with disease suspected to be cattle-plague, shall observe the following rules:—

"(1). He shall, as far as practicable, keep that animal separate from animals not so affected;

"(2). He shall, with all practicable speed, give notice of the fact of the animal being so affected to a constable of the police establishment for the place where the animal is.

"The constable shall forthwith give notice thereof to the Clerk of the Council at the Veterinary Department.

"4. No animal (including a dog) shall be moved alive out of a building or inclosed space in which cattle-plague exists or has existed within seven days.

"5. Where an Inspector of the Privy Council affixes at or near the entrance to a building or inclosed place in or on which cattle are kept, and wherein cattle-plague exists or has existed within seven days, a notice forbidding persons to enter into or on that building or place without his permission, then, if any person not having a right of entry or way into, on, or over that building or place, enters into, on, or over the same, or any part thereof, in contravention of the notice, he shall be deemed guilty of an offence against this Order, and shall, for every such offence, be liable to a penalty not exceeding five pounds.

"6. Every person having been in a building or inclosed place in which cattle-plague exists or has existed within seven days shall, before leaving that building or inclosed place, disinfect his clothes to the satisfaction of the Inspector of the Privy Council or other officer acting on his behalf.

"7. The carcass of an animal that has died of cattle-plague, or has been slaughtered in consequence of being affected with cattle-plague, shall not be moved out of a building or inclosed place in which it has so died or been slaughtered, except in a van exclusively set apart and used for the purpose of conveying such carcasses; and every such van shall immediately after each occasion of use be cleansed and disinfected in manner provided by Article 18 of The Animals Order of 1875.

"8. All milk-cans, churns, pails, tools, and appliances, and other apparatus, used for or about animals in a building or inclosed place in which cattle-plague exists or has existed within seven days, shall be cleansed and disinfected as often, and in such manner, as an Inspector of the Privy Council directs or approves.

"9. Every building or inclosed place in which an animal affected with cattle-plague has been kept while so affected, or has died of cattle-plague or been slaughtered in consequence of being affected with cattle-plague, shall be thoroughly cleansed and disinfected under the direction of an Inspector of the Privy Council.

"10. The provisions of this Order apply to all places being infected places at the time when this Order takes effect.

"11. Nothing in this Order shall relieve any Local Authority affected by this Order, or any of their officers, from the obligation to carry into effect the provisions of the Act of 1869, and the Orders of Council thereunder with respect to diseases other than cattle-plague.

"12. Article 7 of The Animals Order of 1875 shall be deemed to be omitted from that Order, and that Order shall be read and have effect as if the following article was therein substituted:

> "Any dung, and any hay, straw, litter, or other thing commonly used for food of animals, or otherwise for or about animals, may be moved out of an infected place, with a licence, signed by an Inspector of the Privy Council, certifying that the thing moved has been disinfected, but not otherwise; and shall only be so moved, in any case, for the purpose of being buried or destroyed.

"13. If any person fails to give, produce, do, or observe any notice, licence, thing, or rule, which he is by this Order required to give, produce, do, or observe, he shall be deemed guilty of an offence against this Order.

"14. If any animal (including a dog) or any thing is moved or dealt with in contravention of this Order, the owner thereof and the person directing or permitting the moving thereof, or dealing therewith, and the person or company having charge of or removing or conveying the same, shall each be deemed guilty of an offence against this Order."

At a Monthly Council held on May 2nd, the following Report from Professor Brown was read:—

"Immediately after the last Meeting of the Council of the Royal Agricultural Society, a deputation from the Society, and another from the Shorthorn Society, had an interview with the Lord President, on the subject of the action which had been taken by the local authorities in dealing with outbreaks of cattle-plague. Both deputations urged the importance of immediate interference on the part of the Privy Council, in order that uniform and consistent regulations might be applied, at least to that part of the country where cattle-plague had prevailed. In accordance with these representations an Order of Council was passed, which came into operation on April 16th. Under the provisions of this Order the Privy Council has dealt with the outbreaks of cattle-plague which have occurred since it came into force.

"As soon as the Order was passed, inspectors were appointed for the purpose of making inquiries as to the sanitary condition of the stock in the metropolis and its suburbs, and arrangements were made for the slaughter of diseased animals, and the burial or destruction of carcasses; also the slaughter of animals which had been in contact with diseased beasts, and the burning or destruction of manure, offal, and hides, so that nothing but the meat of healthy animals should be removed from an infected place. On this point it may be remarked that no animal was to be deemed healthy which had a temperature indicative of the febrile state. Notwithstanding this precaution, however, several carcasses were condemned as unfit for food, owing probably to the rough method of dressing, and the poor condition of the animals. It should be stated that the officers of the Privy Council have no power to condemn carcasses on the ground of the meat being unfit for human food, and for this reason the medical officer of the district has been asked to inspect them before removal, when it could be done without causing great delay. Arrangements were also made to prevent, as far as possible, the conveyance of the poison of cattle-plague out of infected places by the agency of persons and things which had been employed about diseased animals. The butchers employed have been disinfected before leaving the premises, and the inspectors have instructions to wear waterproof clothing when engaged about places where cattle-plague exists, and to thoroughly disinfect their clothes before quitting infected places.

"As soon as an inspector, in the course of his inquiries, discovers cattle-plague, he is confined for the time to the infected place, and after his work there is completed, he is instructed to change his clothes completely before engaging in any other inquiry; and, in addition, he is required to properly disinfect the clothes which he wore when working in the infected place. Further, each inspector is instructed not to enter premises without the consent of the person in charge. It must be obvious that many difficulties have had to be surmounted in the attempt to organise a new system of action on a very short notice; but I do not hesitate to assert that the inspectors, under the direction of Mr. Courtney, Captain Tennant and Mr. Ricketts, have done all that could be done to carry their instructions into effect in reference to the slaughter and disposal of animals, the disinfection of premises, and the supervision of stock in the districts where the greatest danger of the spreading of disease existed.

"The following cases of cattle-plague have been reported since the Order of April 12th came into operation:—On Tuesday, April 17th, a cow and two calves were found to be suffering from the disease in a shed at Willesden, near the premises in which the first outbreak in that district occurred; the animals were slaughtered, and buried the same day. On Saturday, April 21st, the disease was detected among a herd of forty-nine cows and thirteen calves at Harlesden Green; one cow had died before the Chief Inspector (Mr. Cope) arrived, and several others were found to be infected. All the animals were slaughtered by the following morning.

"On Sunday, April 2nd, cattle-plague was detected in a dairy in Ledbury Mews; all the cows in the shed, thirteen in number, showing signs of disease. In this case also the slaughter of the animals was carried out as quickly as possible.

"On Monday, April 23rd, the disease was discovered in a herd of seventy-five cattle at Kensal Green; and soon afterwards another and larger herd of over 130 animals was attacked in the same district.

"On Wednesday, April 25th, another herd of cows, thirty-eight in number, in Ledbury Mews, was attacked, and several of the animals were found to be diseased when the first inspection was made.

In all these cases the slaughter of the entire herd was directed.

"On Tuesday, May 1st, information of the existence of cattle-plague in a cow-shed at Stoke Newington was communicated to the Veterinary Department, and the Chief Inspector found several animals giving decided evidence of the disease. The slaughter of the whole herd (forty-nine in number) was immediately ordered.

"Three important Orders of Council come into operation to-day, Wednesday, May 2nd; one prohibiting the movement of animals from the county of Middlesex, and their movement within the county, except for immediate slaughter. Another one applying similar restriction as to the movement of cattle within the metropolis; and a third providing for the slaughter of all cattle sent to the Metropolitan Market within the market area. These restrictive measures have been rendered necessary by circumstances which have come to the knowledge of the Veterinary Department."

XII.—*Report on an Outbreak of Splenic Apoplexy near Chelmsford.* By W. Duguid, M.R.C.V.S., Veterinary Inspector to the Society.

At the request of Mr. Marriage, of Moulsham Lodge, I visited his farm on March 6th to inquire into the causes of an outbreak of splenic apoplexy among his stock, and also to suggest means of prevention. The disease first appeared among the feeding-stock, the whole of which, the owner stated, had been improving rapidly, but afterwards three cows in-calf were attacked.

On the morning of March 2nd (when there was a marked fall in the temperature of the atmosphere, and instead of the mild weather which had prevailed during the winter, there was a rather sharp frost), one of the best beasts of the herd was observed shivering. This was at first attributed to cold, and to the partially frozen mangolds with which he had been fed; but, in the course of a few hours, he was in a dying state, and other beasts were becoming affected.

The Inspector of the district visited the farm, as also did a veterinary surgeon, who diagnosed the disease correctly. In the course of two or three days some fourteen animals were so severely attacked that it was deemed advisable to have them killed. Up to this time the disease had confined itself to the feeding-stock, but, on the morning of March 4th, a young cow in-calf was found dead from the same causes. On the morning of the 6th, I found two cows in-calf ill. One had been bled on the previous day, and was progressing favourably, so much so that the usual symptoms of the malady—the shivering and twitching of the muscles, &c.—were very slight, although the owner stated they were well-marked when she was first observed ill. The other cow presented all the symptoms of a well-marked case of the disease—the accelerated and somewhat laboured breathing; the decided shivering and constant twitching of the superficial muscles; the bright, prominent, staring, and bloodshot appearance of the eyes: temperature 104° Fahr. This cow had been bled on the morning of my visit, in addition to which I recommended a dose of purgative medicine, but held out no hopes of recovery. I was afterwards informed by the owner that she died the same night.

It had been suggested by some one that probably the cause of the disease would be found in the water-supply. I inquired into this, but came to the conclusion that it was not so. The farm-buildings, which I found in very good condition as regards paving, drainage, and ventilation, are separated by a wide roadway into two blocks, in both of which the disease had appeared, but the water-supply of each block was from different sources. In the sheds where the cattle were first affected the water used was collected as rain-water on the roofs of the buildings, stored in a deep concrete tank, and pumped up as required. On the other side, the water was taken from a large pond, and was a mixture of spring-water with the rainfall on some grass-land near the homestead. The water in both cases was tolerably clear; and although it contained a good deal of organic matter, and even some moving organisms, I consider it of much better quality than what is often supplied to animals. I noticed particularly that it could not be contaminated by drainage from the cattle-sheds and boxes.

The whole of the stock were in excellent condition, were being fed on cut mangolds with chaff, and were receiving daily 2 lbs. of good cake, besides 5 lbs. of meal, composed of ground maize, lentils, and the broken particles dressed out of Indian wheat. By this feeding the animals were brought into that plethoric condition so favourable to the development of blood-diseases of this class; and the fall of the atmospheric temperature, acting on the surface of the body, proved to some extent an exciting cause, or, I may say, rather determined the date of the attack.

The means of prevention recommended was to change the food, and in particular to modify the feeding as regards the amount of cake and meal. This proved sufficient. Mr. Marriage, writing under date March 24th, informed me that he had incurred no losses among his cattle since the date of my visit.

I may add that I examined the carcass of a pig that died while I was making my inquiries at the farm; but as this animal had been ill previous to anything being seen amiss amongst the cattle, and as it showed post-mortem appearances sufficient to account for death from other causes, I did not consider this case connected with the splenic apoplexy affecting the cattle.

After my visit, however, another sow was found ill, and, from the description given, I believe the animal was suffering from blood-poisoning, communicated in some way from the diseased cattle.

Owing to the presence of cattle-plague in Essex at the time, it was scarcely to be wondered at that considerable alarm existed in the neigbourhood of Chelmsford when it was reported that twenty animals had been attacked in the short space of three days, and that there could be no doubt that the disease affecting them was cattle-plague. This report was published in the 'Mark Lane Express' of March 5th, but was contradicted in the issue of the 12th.

XIII.—*Annual Report of the Consulting Botanist for* 1876.

By W. CARRUTHERS, F.R.S.

THE past year has fortunately not been characterised by the appearance of vegetable blights to any serious extent in England. Even the potato fungus made comparatively little havoc, owing to the exceptionally hot and rainless summer, until the heavy rains of autumn supplied a suitable nidus to the parasite in the potatoes still in the ground.

Several members of the Society have sought my advice in reference to weeds which have baffled their attempts to eradicate them. The consideration of the nature and habits of each particular weed has enabled me to submit methods of treatment which might lead to its eradication. It is impossible to give any general directions equally suitable to all weeds; each must be treated, to a greater or less extent, in accordance with its own peculiarities. Thus, in the case of a clover field in Herts, which was in patches over-run with the stoloniferous variety of *Agrostis alba*, or creeping bent, introduced into a clean and regularly cropped field, probably with impure seed, it was of the first importance to notice the habit this plant has of rapidly increasing by means of its prostrate rooting stems or stolons. Each fragment of such a rooting stem becomes an independent plant, and no amount of ploughing or other labour can clean a field, short of its entire removal by manual labour or its destruction by fire.

Other weeds are more dangerous from their seeds, like the spurrey (*Spergula arvensis*), which injuriously overran the ploughed lands of a member in Durham. Notwithstanding all his care, it continued to increase. This little worthless annual, too often overlooked because of its insignificance, produces an enormous amount of small, hard black seeds, which ripen all through the summer. Nothing but the destruction of the plants as they come into flower, and before they can produce seed, can get rid of them.

Yet other weeds keep their ground from the possession of perennial roots or underground stems, such as the *Colchicum autumnale*, meadow Saffron or Sagons, with which some light gravelly soils in Yorkshire are entirely overrun. It is necessary, as I have advised, in such cases to dig out the whole plant, if the land is to be thoroughly cleaned.

The seeds which have this year been examined by me have been on the whole satisfactory, if I except some samples of grass seeds offered to a member of the Society by a Farmers' Supply Association. The packet of permanent pasture seed was probably the worst which has ever passed through my hands, for though it was clean, it was very light in weight, and only 10 per cent. of the grains germinated. It deserves the consideration of such Societies, and of individuals purchasing large quantities of seed, whether the purchase should not be made subject to examination by a competent person, in the same manner as artificial manures are bought, subject to chemical analysis.

From the various experiments which I have made on behalf of members of the Society, I am satisfied that the chief injury done through seed is due to the mixing of old seed, which has lost its power of germination, with the new and good seed. The length of time during which the vitality of seeds persists is a most important inquiry to the agriculturist. Some are very short lived. It is stated, for instance, on good authority, that if the seeds of the willow get thoroughly dried they will not germinate; while, on the other hand, some seeds, especially such as are enclosed in a thick, firm, and indurated outer covering, or episperm, have persisted for years in a living state. An authentic and interesting case of long continued vitality was that of the seeds of the sacred lotus (*Nelumbium speciosum*) which Robert Brown germinated after they had been a hundred years in the collections of the British Museum, and most probably several years more in the possession of Sir Hans Sloane. The statements as to great longevity in seeds, like those of the mummy wheat, are unproved and incredible.

The question of the longevity of the seeds of cultivated plants is of such importance, that I am undertaking a series of experiments with the view of determining the period in each case at which the power of germination is lost, that is, at which the life of the embryo in the seed is destroyed. I obtained, through the favour of Mr. Brandreth Gibbs, a large series of suitable seeds for these investigations.

I propose to lay before the members of the Society in the next number of the 'Journal,' a paper on the seeds of the cultivated clovers, with an account of the defects and impurities which may be found in them. By the help of carefully prepared illustrations, I hope to make the subject plain and practically useful.

Besides the investigation of seeds for growing, I had submitted to me a sample of linseed on which some young calves were being fed, when some of them were seized with an inflammatory attack of the stomach and bowels, supposed to be due to their food. I found, however, that the seed was good, and that the very few weeds accidentally present were of a harmless character, so that the cause of the malady had to be sought for in another direction.

Specimens of young lucerne were observed by Mr. C. Sewell Read, M.P., on his farm to be suffering from the attack of an insect underground. I examined several specimens, but the injury was too advanced when it was brought under my notice to show the insect which had produced it. A similar disease appeared among some oats on Mr. Read's farm in 1875. The tissues of the oats were destroyed at the base of the stem; this prevented the rise of the sap, and the plants died. Mr. Read observed the same disease last year on Mr. Mechi's farm at Tiptree, also in his oats. I have arranged with Mr. Read to make these diseases a subject of special study should they make their appearance another year at Hovingham.

The Viscount Barbaçena of Brazil sought my advice in April last as to the reclaiming extensive sandy regions on the coast of Brazil, and preventing the progress of moving sands which were converting valuable cultivated lands into barren wastes. This subject has been fully treated of in a recent number of the Society's Journal, but the conditions of vegetable life in Brazil had to be taken into account in considering what plants would be fitted for sand wastes there. I prepared a report on the subject, recommending a series of experiments with various plants, which were to be instituted in the course of this year on the return of the Viscount to his native country. I am hopeful that the results will be successful.

The number of applications for advice has somewhat increased during the past year, amounting to thirty-six in all.

XIV.—*Report on the Trials of Reaping Machines at Leamington, and on Miscellaneous Inventions at the Birmingham Show.* By JOHN ALGERNON CLARKE.

IN a brief General Report on the Exhibition of Implements at Birmingham (in the last Part of the Society's 'Journal') Mr. Jabez Turner, as Senior Steward, referred to the magnitude of the Show, which comprised 6414 entries of articles upon 420 stands. The machinery, implements, and goods filled 1500 railway trucks, yet all were promptly delivered on the Show-ground with few cases of damage. The awards of silver medals were recorded, the proceedings in the trials of reaping-machines on the Earl of Warwick's Sewage Farm were sketched in a few words, and regret was expressed that several eminent firms had abstained from entering into competition. It remains now to give a detailed description of the various machines entered for trial, and to record their respective performances in the field.

REAPING MACHINES.

The prizes offered were for four different classes of reaping-machines, as follows:

	£
CLASS 1.—For the best reaping-machine, with self-delivery in sheaf, clear of the horse-track	30
For the second best	20
For the third best	10
CLASS 2.—For the best reaping-machine, with self-delivery in swathe, clear of the horse-track	20
For the second best	10
CLASS 3.—For the best combined reaping- and mowing-machine, without self-delivery	15
For the second best	10
For the third best	5
CLASS 4.—For the best one-horse reaping-machine	15
For the second best	10
For the third best	5

A limitation was placed upon machines in Class 4, namely, that the power required to work them must not exceed 33,000 foot-pounds per minute, at or about the speed of 2½ miles per hour.

Exhibitors might enter duplicate machines in two different classes, provided that the operations in each class could be performed without adding or taking away parts; but by another regulation, no exhibitor might enter more than one machine of the same construction for competition in any one class.

The Judges of reaping-machines were Colonel Henry Valentine Grantham, of West Keal Hall, Spilsby, Lincolnshire; Mr. James W. Kimber, of Fyfield Wick, Abingdon, Berkshire; and Mr. Thomas Rigby, of Darnhall Mill Farm, Winsford, Cheshire; with Mr. W. Anderson, C.E., (of Messrs. Eastons and Anderson, Erith Iron Works, Kent), as Consulting Engineer, and Mr. John Algernon Clarke, of 109, Ladbroke Grove Road, Notting Hill, London, as Reporter. On Monday, July 17th, and three following days, these gentlemen made a careful examination of the machines entered for competition in the Society's Showyard at Birmingham, having regard to the condition that no duplicates were admissible in any one class, and also to the following instructions:—

> "4. The Judges will be requested to observe that it is left to their discretion to select the implements for trial from those *specially entered* for competition for the Society's Prizes, as well as, if they consider it desirable, from those not so entered.
>
> "5. The Judges will decide on the merits of the work done by any agricultural machines to which steam or other power is applied; but they will be required to pay every attention to the report of the Consulting Engineer, as to the power used, the mechanical construction of the machine, and the quality of workmanship and materials used.
>
> "6. The Judges will be instructed to pay particular attention to the conditions relating to the qualifications each machine should possess, and to the speed and pressure as given."

The question, "What constitutes a duplicate?" was settled by the following considerations. Obviously it would not be sufficient to lay down as a rule that machines were not duplicates unless they were exactly similar in construction in every detail, of precisely the same pattern, and with precisely the same dimensions in all the working parts. For parts might differ, and yet the effect of their action might be exactly the same. Thus, a spur-wheel of one hundred teeth, driving another of fifty teeth, would produce two revolutions of the latter for one revolution of itself; and a wheel of eighty teeth, driving another of forty teeth, would give the same result. So that the motions would be practically duplicates, unless there were some advantage gained in working, such as a lessening of friction on the bearings. Hence it was decided that slight variations in constructive detail did not render very similar machines eligible to compete in one and the same class, unless some palpable difference in operation were effected by such variations.

In Class 1 (Sheaf-delivery Reapers) it was decided that Messrs. R. Hornsby and Son's two machines, No. 468 and No. 469 were not duplicates, although very similar in general construction; as one has four rake-arms and the other six, and the latter cannot be converted into the former by simply removing two of the arms, neither can the former be converted into the latter by attaching two additional arms. Two machines of the same firm, No. 463 and No. 465, both of them five-armed machines, with controllable self-delivery, were allowed to pass as not being duplicates, seeing that one has a main driving-wheel of larger diameter than the other, which makes a difference in adaptability to travelling across ridge and furrow, and over ground in a wet and soft state. In the larger-wheel machine, also, the rake-arms are shorter, and driven at a slower speed than in the other. Messrs. Hornsby's two six-armed machines, with controllable delivery, were not duplicates; as in No. 466 the main-wheel is of larger diameter, and the centre of the rake-arms, or delivery motion, is placed more backward than in No. 464.

In Class 3 (Combined Reapers and Mowers) Messrs. Hornsby's "Paragon," No. 474, differed from their "Paragon," No. 473, in having fingers 2½ instead of 3 inches apart; and the lighter frame of their machine, No. 475, was held to constitute a sufficient difference between it and No. 473. On the same ground Messrs. Lewis and Lowcock's light-framed machine, No. 1031, was allowed to compete, as well as their generally similar, but stronger machine, No. 1027. Besides, to have disqualified two machines in this Class as duplicates, when one is more strongly constructed than the other, would have stultified the course adopted in the trial of the same class of machines at Taunton in 1875.

It is a question whether, in future trials, the number of machines in competition might not be reduced with advantage by the very fair method of permitting an exhibitor to elect with which one out of two or more very similar machines he will enter into trial.

The Judges examined into and determined the relative positions of the various Reapers with respect to some of the qualifications described in the "Scales of Points of Merit" drawn up by the Society and printed in the Prize Sheet; leaving the most important, namely, those depending upon actual performance, to be ascertained at the trials which it was arranged should be conducted at harvest-time at Leamington.

For Classes 1 and 2 (Sheaf-delivery and Swathe-delivery Machines) the points representing perfection were:—

1. Mechanical construction, workmanship, quality of materials, and their adaptation to the purpose	250
2. Arrangement of gearing-crank and its connections; form of knife and bar, with make and position of fingers, and facility of adjusting height of cut	100
3. Mode of delivery, action, and efficiency of mechanism employed	100
4. Position of seat with reference to balance, and specially with regard to driver's safety, and general command of machine	100
5. Lightness of draught in and out of work (This point to be taken in connection with the weight of machine, side draught, width of horse-track, weight on horses' necks or backs, and width of cut.)	125
6. General perfection of work, including evenness of cut, freedom from clogging and waste, efficiency of delivery, and capability of dealing with laid or tangled crops	300
7. Price	25
TOTAL	1000

For Class 3 (Combined Reaping and Mowing Machines) the points of perfection were:—

1. Mechanical construction, workmanship, quality of materials and their adaptation to the purpose	250
2. Simplicity and lightness, combined with strength	100
3. Arrangement of gearing-crank and its connections, form of knife and bar, with make and position of fingers, and facility of adjusting height of cut	100
4. General arrangement and adaptation of machine for working on uneven ground	100
5. Lightness of draught in and out of work (This point to be taken in connection with the weight of machine, side-draught, width of horse-track, weight on horses' necks or backs, and width of cut.)	125
6. General perfection of work, including closeness and evenness of cut, freedom from clogging and waste, and mode of delivering crop	250
7. Price	75
TOTAL	1000

For Class 4 (One-horse Reaping Machines) the points were:—

1. Mechanical construction, workmanship, quality of materials, and their adaptation to the purpose	250
2. Arrangement of gearing-crank and its connections, form of knife and bar, with make and position of fingers, and facility of adjusting height of cut	100
3. Mode of delivery, action, and efficiency of mechanism employed (if any)	100
4. Position of seat (if any), and ease of management	100
5. Lightness of draught in and out of work (This point to be taken in connection with the weight of machine, side-draught, width of horse-track, weight on horses' necks or backs, and width of cut.)	125
6. General perfection of work, including evenness of cut, freedom from clogging and waste, efficiency of delivery, and capability of dealing with laid or tangled crops	250
7. Price	75
TOTAL	1000

For ascertaining the weights of the machines, and the distribution of the load upon the wheels and pole, a platform was arranged, with an overhead framework; and each machine in turn was suspended by spring-balances specially made for the purpose by Messrs. Salter and Co. In this way were found and recorded in each case, as given in the Tables accompanying this Report, the total weight of the reaper, and the loads on the main driving-wheel and on the off-wheel respectively, together with the load on the end of the draught-pole, held 36 inches above the ground—a driver weighing 168 lbs. being mounted on the seat in position as when at work. It will be observed, on referring to the Tables, that the weight of the sheaf-delivery machines in Class 1 ranged from 1055 lbs. (The Johnston Harvester Company) to 1231 lbs. (one of Messrs. Hornsby's six-armed machines). With the driver mounted in position for work, the load on the driving-wheel was made nearly as great as the whole weight of the machine; actually exceeding this in one case, namely, in Messrs. Hornsby's reaper just mentioned, in which the weight, empty, was 1231 lbs., while the load on the driving-wheel, giving bite on the ground when in work, was 1235 lbs. At the same time, the load on the off-wheel in this machine was a minimum, namely, 168 lbs.—tending to lessen side-draught. The weight on the end of the pole ranged from nothing in the case of one of Messrs. Hornsby's six-armed machines to 20 lbs. in that of The Johnston Harvester Company. But when in work the weight on the horses' neck was increased in some proportion to the power required for driving the machine.

A minute inspection was made of each machine; notes were taken of the strength and design of framing, quality of materials, excellence of workmanship, arrangement and proportions of gearing, modes of adjusting the height of cut and for altering the position of the fingers, the construction, dimensions, and speed of the cutting apparatus, with the depth of knife-section for effective cut and the distance advanced at each stroke, the mechanism for actuating the gathering and delivery rake-arms, and for controlling or adjusting the rate of delivery of the sheaf-bunches, the provision made against undue friction, appliances for lubrication, replacement of wearing parts, facilities for easy management, position of the driver's seat, and other features of mechanical construction to be taken into account in settling the relative points of merit to be awarded under the several heads formulated by the Society.

The trials on the Earl of Warwick's Heathcote Sewage Farm, near Warwick, commenced on Monday, August 14th, every necessary arrangement having been made, all contingencies provided for, and the greatest possible attention being devoted to the management of the week's proceedings by the Stewards, Mr. Jabez Turner, Mr. J. Bowen Jones, Mr. John Hemsley, and Mr. G. H. Sanday, and by Mr. H. M. Jenkins, the Secretary.

Here the important and laborious task of conducting the dynamometer experiments was entrusted to Mr. W. E. Rich, C.E. Each machine was first placed upon a true horizontal platform, and gauged to cut at four inches from the ground, and then attached to the Society's draught-dynamometer, or "mechanical horse," which registered both the force expended in drawing the reaper forward and the amount of side-draught tending to divert the end of the pole in a direction at right angles to the line of advance. Running light on an ordinary farm-road, the machines in Class 1 had a draught ranging from 62 lbs. (one of Messrs. Hornsby's six-armed machines) to 82 lbs. (The Johnston Harvester Company's reaper). Ten machines in this Class were tested in a clean upstanding crop of wheat, having a good rather strong straw, bright and slippery, about 3½ to 4 feet high; six were selected. Their performance is stated in Table I., and exhibited in a graphic form in the Diagram (Fig. 1, p. 253). The speed was preserved uniform, as nearly as might be, at 2⅓ to 2¾ miles per hour; and the draught per inch width of cut ranged from 3·2 lbs. (The Johnston Harvester Company's five-armed machine), which was the lightest, up to 3·46 lbs. (one of Messrs. Hornsby's six-armed machines). The comparison is of value to a certain extent; but it is obvious that such small differences in the number of pounds draught per inch cut cannot be accurately said to represent the relative amounts of power required to do the same work unless the cutting were equally perfect and the gathering and delivering of the sheaves alike in both cases.

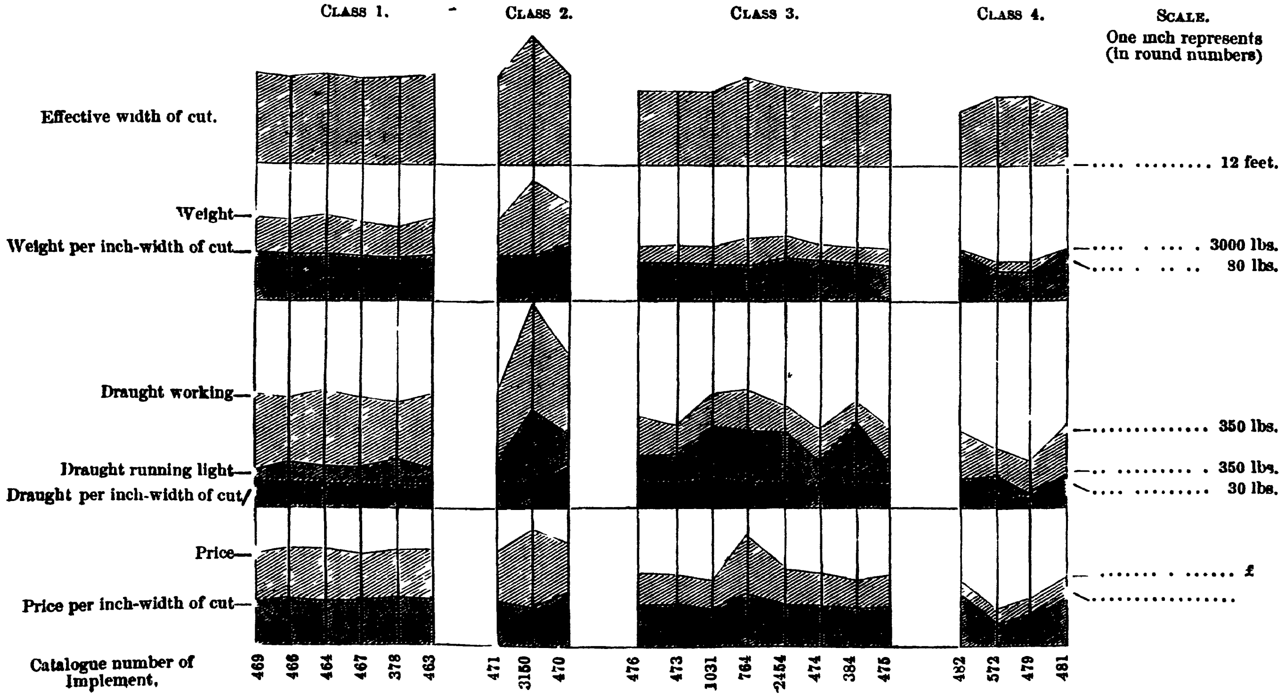
In Class 2 (Swathe-delivery Machines) the Beverley Iron and Waggon Company's three-horse reaper showed a draught of 3·86 lbs. per inch width of cut, and Messrs. Hornsby's two-horse swather 4·63 lbs. per inch width of cut. The total mean draught of the Beverley machine, taking a cut 7 feet wide, was 358·8 lbs., and of Messrs. Hornsby's machine, taking a 5 feet cut, 266·5 lbs.; and while the draught per horse was, in the latter case, 133 lbs., in the Beverley three-horse machine it was 119 lbs. per horse. Messrs. Hornsby's six-armed reaper, worked as a swather in this Class, had a draught of 100 lbs. per horse, and 3·49 lbs. per inch width of cut; but the work done was not really clean swathing. It is necessary to state, in justice to the Beverley machine, that, owing to the difficulty of steering when the dynamometer was attached to the propelling shafts in the rear, no course appeared practicable but to charge it into the standing corn; the delivery thus undoubtedly taking more power than if the machine had been worked, as all others were, with the crop on only one side and the other side clear for the swathe or sheaf-bunches to fall; while urging a machine, measuring 8 feet 9½ inches width over all, through a clearance cut 7 feet wide, must have considerably augmented the draught, as compared with traversing it along one side of the crop and with difficulty maintaining the full breadth of cut. Hence, the true draught of the Beverley Reaper must have been less than that indicated by the figures in Table I. and the Diagram (Fig. 1).

In the dynamometer testing of the Combined Reaping and Mowing Machines (Class 3), some noticeable results were obtained. Thus, the draught of Messrs. Brigham and Co.'s machine (No. 384) in cutting wheat was 183·7 lbs., and when running light on a farm-road it was as much as 149·6 lbs. Messrs. Hornsby's "Light Paragon" (No. 475) had a draught in work of 141·8 lbs., and running on the road only 73·4 lbs., or little more than half. The width of cut being 45·7 inches by the Hornsby machine and 52 inches by the Brigham machine, brought the draught per inch width of cut to 3·1 lbs. for the former, and 3·53 lbs. for the latter. The lightest draught was shown by Messrs. Hornsby's "Paragon" machine (No. 474), with fingers 2½ inches apart, namely 2·97 lbs. per inch width of cut; and the heaviest draught was that of Messrs. Lewis and Lowcock's machine (No. 1031), 4·1 lbs. per inch width of cut. A trial was made with Messrs. Bickerton and Sons' machine, to compare the draught at two different speeds of the crank; the lesser number of strokes of the knife per minute giving a draught of 3·42 lbs., and the greater number of strokes a draught of 4·22 lbs. per inch width of cut. This was in cutting wheat.

In Class 4, One-horse Reaping Machines, the condition laid down was that the power required should not exceed 33,000 foot-pounds per minute, at a pace of about 2½ miles per hour. Tried on the same wheat-crop, Messrs. Brigham and Co.'s machine (No. 385) was disqualified from competition, the power taken being 38,654 foot-pounds. The other machines required motive-power as follows:—W. Mattison, manual delivery (No. 573), 30,932 lbs.; Hornsby and Sons (No. 482), with three self-delivery rakes, 29,700 lbs.; Hornsby and Sons (No. 481), with three controllable self-delivery rakes, 28,666 lbs.; W. Mattison, manual delivery (No. 572), 26,268 lbs.; Hornsby and Sons, manual delivery (No. 478), 20,460 lbs.; Hornsby and Sons, manual delivery (No. 480), 18,931 lbs.; and Hornsby and Sons, manual delivery (No. 479), 18,229 lbs.—this last machine weighing 546 lbs., cutting 4 feet breadth, with a draught of only 1·89 lb. per inch width of cut.

On reference to the very full and complete Tables compiled

Fig. 1.—*Diagram showing the relative Results of the Trials of Reaping Machines at Leamington.*



by the Consulting Engineers, it will be seen in what proportion the points of merit under the several heads were awarded to each machine in all the classes; but to exemplify the effect of judging by the points laid down, it will suffice here to take Class 1, Reapers with Self-Delivery in Sheaf. The points determined principally, though not entirely, by inspection, were: (1) Mechanical construction, workmanship, quality of materials, and their adaptation to the purpose. (2) Arrangement of gearing-crank and its connections, form of knife and bar, with make and position of fingers. (3) Mode of delivery, action and efficiency of mechanism employed. (4) Position of driver's seat with reference to balance, and specially with regard to driver's safety and general command of machine. (7) Price. These points were not entirely determined by inspection, because the award of points (3) and (4) was to some extent guided by observations made during the working of the machines in the field; while (7) merit in respect of price was decided last of all, not according to the absolute figure charged for each machine, but giving the highest number to that machine which both under inspection and in performance possessed the greatest number of points of merit in proportion to its selling price. The points determined by performance were (5) lightness of draught in and out of work, and (6) general perfection of work. Arranging the points gained by the several sheaf-delivery reapers into these two groups, the achievements of each under the respective divisions appear as in the following Table:—

Name of Exhibitor.	Catalogue Number.	Description of Machine	Points determined principally by Inspection.	Points determined by Performance	Total Points of Merit.	Honour Awarded.
		Perfection being ..	575	425	1000	
Hornsby and Sons ..	464	Six rakes controllable .	567	390	957	First Prize.
Hornsby and Sons ..	463	Five rakes controllable	557	381	938	Second Prize
Hornsby and Sons	466	Six rakes controllable ..	550	375	925	Third Prize
Hornsby and Sons ..	469	Six rakes	542	382	924	Highly Commended.
Hornsby and Sons	467	Five rakes controllable	550	358	908	Highly Commended.
Johnston Harvester Co.	378	Five rakes controllable	440	395	835	Commended.

It will be seen that the first, second, and third-prize machines were first, second, and third in merit according to the points chiefly determined by inspection; and that, as compared with each other, they stood in the same order for excellence of performance. Nevertheless, the machine, namely that of The Johnston Harvester Company, which gained the highest number

of points for performance in the very brief trial at Leamington, stood last in respect of total merit, on account of its small number of points according to inspection. Upon analysing the points obtained for performance, it appears that the several machines stood in the following order in respect of (5) lightness of draught, and (6) general perfection of work, respectively:—

Name of Exhibitor	Catalogue Number.	Description of Machine	Points for Lightness of Draught.	Points for General Perfection of Work.	Total Points for Performance.	Honour Awarded.
		Perfection being ..	125	300	425	
Johnston Harvester Co.	378	Five rakes controllable	125	270	395	Commended.
Hornsby and Sons ..	464	Six rakes controllable ..	100	290	390	First Prize.
Hornsby and Sons ..	469	Six rakes	112	270	382	Highly Commended.
Hornsby and Sons ..	463	Five rakes controllable	105	276	381	Second Prize.
Hornsby and Sons ..	466	Six rakes controllable ..	105	270	375	Third Prize.
Hornsby and Sons ..	467	Five rakes controllable	108	250	358	Highly Commended.

Hence The Johnston Harvester Company's reaper took the highest number of points for performance mainly from the lightness of its draught, while it stood fairly well for general perfection of work; and Messrs. Hornsby's first-prize machine, though it gained by far the highest number of points for general perfection of work, came second to the Johnston machine in total points for performance, owing to heavier draught. The dynamometer testing, it must be remembered, was conducted in an easy crop. But remarks with regard to the comparative draughts of the two machines here named will be found in the description of the trials.

It is evident that to have determined the relative merits of the machines by performance only, or even mainly by performance, would have been untrustworthy, unless the trials had extended through a considerable period, say a whole season, in the cutting of large areas of cropping; and an adequate safeguard against the possibility of the honours being won in the short trials on small plots by any machine which would not be likely to prove lasting in its efficiency, was provided in the mechanical or engineering points of merit settled principally by a careful examination of all details of construction. At the same time, it may be open to question whether the scale of points might not be revised with advantage in one or two particulars—apportioning the number of points under the several heads in more just accordance with the true relative values of the different qualifications required.

The trials began on Monday, August 14th, on the Earl of Warwick's Heathcote Sewage Farm, near Leamington, to which rendezvous the machines entered for competition had been conveyed from Birmingham in charge of the Society's officers. When Mr. Jenkins unlocked the doors of the barn which held in densely packed order the whole of the machines, with their multitude of wheels, platforms, frames, poles, rake-arms like serrated wings, and finger-bars like shining rows of teeth (so that a labourer at once dubbed it "The Chamber of Horrors"), it was found that two reapers exhibited by Mr. William Anson Wood at Birmingham had, in some unexplained manner, disappeared out of custody. This still further reduced the competition, already limited to small proportions by the absence of several of the most eminent British and American makers.

As on previous occasions, one of the Beverley Iron and Waggon Company's Two-horse Reapers, alone capable of performing the work, was employed by the Stewards to open out the necessary rectangular plots in the ample crops of wheat and barley, which did credit both to the sewage treatment and to Lord Warwick's able farm-manager, Mr. Tough.

CLASS 1. *Reaping Machines with Self-delivery in Sheaf, clear of the Horse Track.*—The first trial was with Class 1, Sheaf-delivery Reapers, on a field of 11 acres of red wheat, a light crop, very ripe, in fact already "goose-necked," with a rather strong straw of about 3½ feet length, generally upstanding, but in places somewhat storm-broken—a clean crop on a gravelly soil —and both ground and crop dry. Each machine had a preliminary run, and was then set to cut a half-acre plot, no exhibitor's attendant being permitted to follow after the first round. The order of trial was as follows:—

No. 1.—*Messrs. R. Hornsby and Son's* Six-armed Machine (No. 469 Catalogue number), like the other machines entered by that firm in this Class, is denominated a "spring-balance" reaper; the principle of construction being that the main wheel, instead of being hung upon the main frame or upon a bracket held rigidly by adjustments on the frame, is hung upon a bracket which is free to rise and fall, this bracket being hinged to the frame at one end, and at the other end supported by a rod which compresses a spiral spring. The bracket is so shaped as to form in effect a bell-crank lever, the horizontal long arm carrying the stud-axle of the main wheel, while the vertical shorter arm is held by the horizontal rod from the spring. In the engraving (Fig. 2) giving a view of one of the spring-balance reapers, the position of the spring is shown. The principal weight of the machine is, in effect, carried by this spiral spring, so that a very considerable amount of jolting and straining is avoided. The saving of the machine from shocks and severe strains renders safe and sufficient a lighter frame, and risk of fracture is reduced. At the same time, the more steady, quiet, and easy travelling of the machine tends to diminish the draught. The driver's seat is to some extent supported, and certainly preserved from violent jolting, by the action of the spring. A quickly acting screw-motion with gauge, by lengthening or shortening the spring-rod, alters the average position

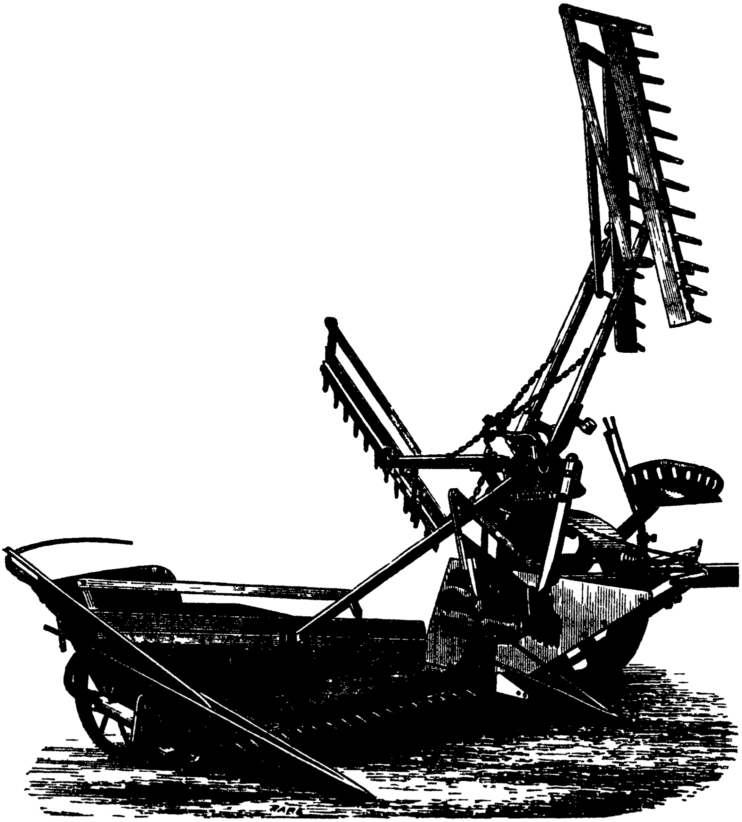
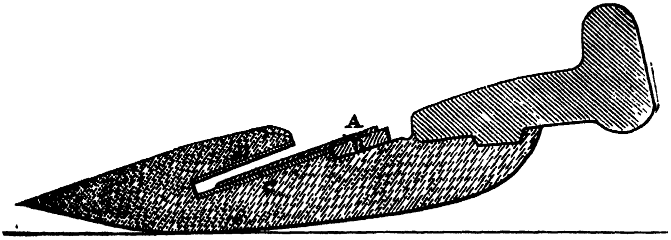


Fig. 2.—*Front View of Messrs. R. Hornsby and Sons' Spring-balance Reaper.*

of the main-wheel bracket, so as to raise or lower the whole machine. There is a simple motion for adjusting the height of the off-wheel; a long lever enables the driver to alter the vertical angular position of the pole for altering the dip of the fingers; another lever is provided for putting the driving parts in and out of gear, and there is a self-acting clutch which slides out of gear when the machine is being backed. The main frame and brackets carrying gear are made of cast iron; the smaller castings of malleable iron. The main-wheel bush is removable by three bolts; the first or large spur-wheel upon the main travelling-wheel is also removable in the same way. The bottom-bearings are bushed with brass, and there are oilcups for self-lubricating. The main wheel is of 2 feet 6 inches diameter, with plain tire 8 inches in breadth, provided with an inclined scraper. The cutter-bar, taking a 5¼-feet cut, is in line with the main-wheel centre; but the centre of the rake or delivery-motion is 4 inches in advance of the main-wheel axis and cutter-bar. The fingers are of malleable iron, double-plated with steel, that is, with steel edge-plates on both the upper and lower faces. The section (Fig. 3, p. 258) shows the form of the finger, which is made peculiarly strong at the end of the slot, at which

Fig. 3.—*Vertical Section of Messrs. R. Hornsby and Sons' Reaping Machine Finger and Knife.*



point fingers are most liable to break. C and D are the lower and upper plates of steel cast in one piece with the finger; A is a knife-section, and B the knife-bar. The fingers are 3 inches apart, centre to centre; the knife-sections, riveted above the bar, measure the same, and the traverse of the knife-bar, or throw of the crank, is 5½ inches, and thrust upwards. It is claimed that friction and motive-power are saved by jointing the crank connecting-rod to the knife-bar, not at the end, but at a point some distance along the bar.

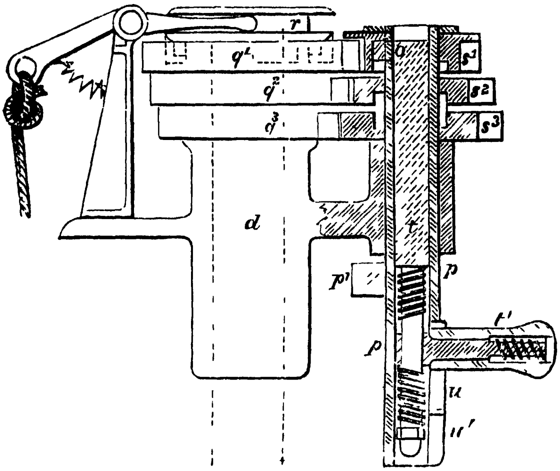
In this machine the six rake-arms are hung to the revolving horizontal rake-wheel by hinges which allow them to rise and fall; and each arm is supported by a rod, connected at its lower end to the arm by a small ball-and-socket joint, and hooked at its upper end, higher than the rake-wheel, to a centre, rotating upon the upper end of the fixed delivery-motion axis. This fixed axis is bent and cranked so as to support two centres, a few inches apart, above the rake-wheel and leaning over the reaper platform; and by hooking any rod to the lower of the two centres, the rake so lowered will sweep close to the platform, acting as a delivery-rake; while, by hooking the rod to the upper centre, the rake will sweep at sufficient height over the platform to leave the corn still collecting, and thus operate as a gatherer. This is, therefore, a remarkably simple adjustable delivery; but not controllable while the machine is working, as in other of Messrs. Hornsby's reapers. In the trial, two opposite arms out of the six were set to deliver, while four were set as gatherers; each sheaf-bunch being thus gathered and brought to the knife by three arms, and swept off the curved platform by the third. A very effective dividing-iron is attached to the machine, and a shelf-divider on the side of the platform is raised or lowered to suit great or light crops. The width of the machine over all is 8 feet 1½ inch.

The machine was worked with ten "spring-clearers" upon the platform—spikes or fingers, about 5 inches long, upon joints, so that they will either stand upright or fold backward, each being held up in position by a small spiral spring which allows the finger to fall back when the sheaf-bunch is being swept off the platform, and to jump up again directly the pressure of the corn has been removed. These clearers placed in a line about 1½ ft. back from the cutter-bar, and at intervals permitting the rake-teeth to pass between, are designed to effectually separate the sheaf-bunch from the corn following, when the lay of the crop is much over the platform; but this operation was not observed to be of particular advantage during the trial.

The superb Grantham team (one horse nineteen, the other seventeen years old, the same pair which worked the machines in 1869, at Manchester, and also in 1875, at Taunton) took the machine along at a moderate pace; the cut was clean, making a 3-inch to 4-inch stubble; and the sheaf-bunches, delivered from the slightly upcurved or screw-formed platform, at 12½-feet intervals, were only fairly laid, being spread to about 5 feet breadth, with wisps of the bright and slippery straw lying too much crosswise over the rest.

No. 2.—*Messrs. Hornsby's* Five-armed "Spring-balance" Reaper (465 Catalogue number) with "Controllable" Delivery. The main wheel is of 2 feet 10½ inches diameter, with a plain tire of 7 inches breadth, and an edge-scraper to clear it from dirt. The cutter-bar, in line with the axis of the main wheel, is of angle-iron, the fingers being affixed under the bottom plate. The knife-sections are 3 inches wide, centre to centre, and the throw of the crank 5½ inches; the thrust of the crank connecting-rod is downward, while in the former machine (No. 469) it is upward. The new "controllable" delivery enables the driver to instantaneously vary the rate of delivery without changing the gearing or stopping the machine; that is, according to his judgment of the requirements of different parts of the crop, or holes, or laid places met with; or for carrying the sheaf round a corner he can, by a movement of his hand, alter the rake-motion so as to deliver by all the arms, or deliver by none (using all as gatherers), or by every second, or every third, or every fourth arm in succession. The effect is that in this machine, with a main wheel 2 feet 10½ inches diameter, and the rake-arm motion making one revolution in every 25 feet advance of the machine, the driver has the option of depositing the sheaf-bunches at every 5, 10, 15, or 20 feet; or of stopping the delivery altogether. The remarkably ingenious mechanical arrangements by which all this is placed under easy command may be briefly described thus:—Upon a fixed upright shaft turns freely the wheel, or rake-carrier, upon which all the rake-arms are hinged or jointed, so that they are at liberty to move in a vertical direction only; and each arm is suspended by a chain, the five chains being hooked to a collar or centre rotating upon the upper end of the fixed shaft. This is cranked or bent over towards the platform, so as to fix the centre in such a position that the chains allow the rakes in their lowest position to sweep the platform, while they hold up the rakes in their highest position clear above the head of the driver. But each arm is also supported while passing over the platform, and for about one-third of its revolution after leaving the platform, by a friction-roller travelling over a circular incline or cam, undue friction being avoided by placing this roller about 10 inches from the joint or hinge-end of the arm. As in some other machines, two fixed or stationary cams or guides are provided; the roller carrying the weight of the rake-arm being permitted to traverse along the lower cam, when the rake is to sweep close down upon the platform to deliver the sheaf, but being shunted by a small switch on to the upper guide when the rake is to rise above the cut stuff on the platform, after having acted as a gatherer bringing the standing crop to the cutter-bar. It will be understood that when the switch is open, all the rakes will follow the course of the lower guide; and when the switch is closed, all will rise after bringing the corn to the cutter-bar, and will follow the course of the upper guide. Hence, in order to vary the intervals of delivery, it is necessary that the switch should be opened and shut by the machine at regular intervals, which may be longer or shorter at the choice of the attendant. The switch is kept closed by a spring, and opened by the action of a sliding piece and connections, caused to move once at each rotation of a small cam for the purpose; and the variation of the delivery to every second, third, or fourth rake is effected by setting the differential gear which actuates this cam, so as to increase or diminish the number of its revolutions relative to the speed of the rake-motion. The cam can be driven at three different speeds; with the quickest speed it makes one revolution while two rake-arms are passing a given point, while with the slowest speed it revolves once in the time that four rakes are passing. Fig. 4 is a section showing the contrivance by which these changes in the speed of working the switch are accomplished. Upon the fixed upright shaft or axis *d*, carrying the wheel and boss to which the rake-arms are hung by joints, and immediately underneath and within that wheel are three toothed pinions, q^1, q^2, q^3, formed in one piece, and able to turn freely on the axis. They can be set fast to the wheel or rake-carrier, so as to turn with it, by means of the sliding clutch *r*, this clutch being held in gear with the pinions by a spiral spring, but raised so as to throw the pinions out of gear with the rake-wheel, whenever the driver pulls a cord attached to the clutch-lever.

Fig. 4.—*Vertical Section of Messrs. Hornsby and Sons' Contrivance for varying the speed of Rake delivery.*



The wheels q^1, q^2, q^3, gear with other wheels, s^1, s^2, s^3, mounted loosely upon a hollow axis *p*, which is carried by a bracket as shown; and within this axis there is a sliding bolt, *t*, with a nib, *o*, upon it, which projects through a slot in the side of the axis, and enters into a notch formed for it in one or other of the wheels s^1, s^2, s^3. In the position shown by the drawing, the bolt being in its highest position, the nib upon it engages with the wheel s^1, and renders this wheel fast with the axis *p*. t^1 is a handle which is able to slide along the bolt *t*, being held between two springs which tend to keep it midway between them; the handle itself is in two parts, as the drawing indicates, and one slides on the other, so that the handle may be set and cocked at pleasure in one or other of three holes, *u*, which communicate the one with the other. When the handle has been moved from one hole to another, the bolt follows it as soon as the rotation of the wheels s^1, s^2, &c., brings the notches in them to coincide, so that the nib may be able to pass from one to the other. The delivery will be effected either by the second, third, or fourth (or it might be the third, fourth, or fifth) rake, according as the handle t^1 is placed in the upper, middle, or lower hole; or the operator can cause every rake in passing to clear the platform, and then what is practically a swathe delivery is obtained. This he does by throwing the clutch *r* out of gear when the switch is raised. Or again, the operator can at pleasure hold off the delivery for any time that he may desire, by throwing the clutch out when the switch is down.

In the trial the delivery was set for every fourth rake, depositing a bunch at every 20 feet, which, in that crop, made the sheaves too big; still the delivery was exceedingly good. No spring clearers were used upon this machine. An observation was made as to whether the somewhat sudden rising of the gatherers in front of the cutter-bar tended to whip out the corn; but no fault of this kind was perceived, though it might be so where the crop leans very forward. The 4-inch to 5-inch stubble was beautifully cut.

On Plot No. 3 was tried the "Excelsior" Four-armed Reaper (381 Catalogue number) of *Messrs. Brigham and Co.*, of Tweed Implement Works, Berwick-on-Tweed. This machine, cutting 4 feet 9 inches breadth, with a total width of 8 feet 6½ inches over all, has a driving-wheel of 2 feet 7 inches diameter, with a 7-inch-broad ribbed tire. The cutter-bar is in line with the main wheel; the malleable iron fingers are riveted on the bar, the knife-sections are 3 inches wide, and the throw of the crank is 3 inches, with the thrust of the connecting-rod upward. Lubrication of the crank-bearing is provided for by making the connecting-rod head as a box holding oil round the crank-pin. The toothed wheels are of malleable iron. The height of the fingers is adjusted by means of a bar connected with a rack with holes placed under the pole; but the machine has to be stopped to make the alteration. The driver's seat is set out from the pole. The delivery is effected by two opposite rakes, which balance each other, and the gathering by two alternate arms which are jointed independently of each other; and the centre is placed a little backward of the line of the cutter-bar. There are two fixed cams or guides; one carrying the gatherers, and the other directing the course of the balanced rakes; this cam being so shaped that, when each rake is engaging with a sheaf, it has reached the lowest point, and traverses level over the platform.

In work this machine made a fair cut, leaving 4-inch stubble; but while some of the sheaves were laid square, others were scattered and spread in fan-form, with much litter between bunch and bunch. This was with a slippery straw, and encountering only the natural leaning of the crop without wind. Toward the conclusion of the run, stuff began to wrap round the rake-gear. Allowance was made in consideration of a heavy laid hole at the north-west corner of the plot; Messrs. Brigham were also unfortunate in meeting with a large stone, which gapped and broke a knife-section; this was replaced, however, after some delay.

No. 4.—*Messrs. Hornsby and Sons'* Six-armed Controllable "Spring-balance" Reaper (466 Catalogue number) makes a 5-feet cut, with a breadth of 8 feet over all. The driving-wheel is of 2 feet 10½ inches diameter, with 7½-inch plain tire; the crank driving-gear similar to that of their machine No. 465; but differently timed. The fingers are 3 inches apart, and the throw of the crank 5½ inches, with thrust downward. The centre of the delivery-motion is placed 3 inches backward of the line of the cutter-bar; and the delivery is optional by every third, fourth, or fifth rake, by all, or none.

The sheaves were fairly deposited off the flat platform by every fourth rake, though one pile of three sheaf-bunches together, stubble-ends upward, appeared, from the man having carried the stuff too far in turning a corner. Running in a heavier part of the crop, this reaper could not produce a cut looking so well as on the former plots; there was one badly-laid and twisted place, and some decapitation of ears went on along the north-east side.

Next, on Plot No. 5, came the Self-delivery Reaper (379 Catalogue number) of *The Johnston Harvester Company*, John Spencer, Agent, 5, Euston Road, London. The main driving-wheel is of 3 feet diameter, with 6½-inch tire, and a scraper in the rear; and the off-wheel is unusually large, being of 2 feet diameter. One great peculiarity is that a bevel-wheel affixed to, and forming a portion of the main wheel, drives by a bevel pinion at the highest point a vertical axis, and this, by multiplying spur-gear, actuates the crank-shaft, which is also vertical. The stroke is 3 inches, the knife sections 3 inches broad, and the width of cut 4 feet 9 inches. The total breadth of the machine is 9 feet 7 inches. The finger-bar is made of cold rolled angle-iron, and is therefore very much stiffer than an ordinary flat bar; while wood framing is used for the platform; the pole is set low, and the driver's seat is placed outside the main wheel a trifle behind the centre. The raising and lowering of the machine are effected by a lever operating on a chain passed over a pulley. The five rake-arms are hung by joints upon a revolving-wheel, or carrier, which is placed in a rather low position, and are supported and guided by small friction-rollers, one attached beneath each rake-arm very near to the joint; these rollers traversing against a fixed cam so shaped as to guide the rakes over the platform, lift them after delivery, uphold them while returning to the front, and lower them in a curved sidelong path into the standing corn. By means of an outer and inner channel to the cam, and a shunt motion with a facing-point switch, the rakes are made to act as gatherers or deliverers at pleasure. The switch is worked by a rotating lug upon a short axis driven by spur-pinions from the main rake-motion axis; and the rakes are controllable to this extent—that, by removing the small pinion from the lug axis, and replacing it by a pinion of a different size, the switch is opened for every second or third, or fourth rake; that is, by stopping the machine, it can be set to deliver sheaves at every 8, 12, 16, or 20 feet; while, without stopping, the driver can, by pressing his foot on a treadle, slide up the pinion which drives the shunting motion so that the switch will not be worked, and all the rakes then act as gatherers, the machine carrying the sheaf as when cutting thin places in the crop, or when passing round corners.

In the trial, this reaper delivered by every fourth rake; some of the sheaf-bunches, at intervals of about 15 feet, were fairly laid, but others were fanned; and it was noticed that the gatherers in their upward jerk occasionally whipped out grain. Owing to the sharp incline of the downward sweep of the rakes in entering the crop, there was a tendency to bring the ears down, instead of raising them up, as is the case when rakes enter the crop in a more sidelong direction; the effect being that many ears were cut off short. The stubble was left 4 to 5 inches long. It is to be noted that the Harvester Company had the disadvantage of working horses from London which had never seen a reaping machine before; and a badly laid patch of the crop was encountered at the south-west corner of the plot.

On No. 6 came *Messrs. Hornsby & Sons'* Six-armed controllable "Spring-balance" Reaper (464 Catalogue number). In this machine, taking a 5 feet 3 inch cut, with breadth of 8 feet 2½ inches over all, the main wheel is of 2 feet 6 inches diameter, with plain 8 inch tire and scraper. The fingers are at 3-inch intervals, with the travel of the knife-bar 5¼ inches, and the thrust of the crank connecting-rod upward. The cutter-bar is in line with the main-wheel axis, and the centre of the delivery motion is 3 inches in advance of that line.

In the trial the delivery was by every fourth arm, and the sheaves were laid in the best style which had been seen up to this stage of the proceedings. Part of the plot was light, but part heavy, without, however, being really laid.

No. 7.—*Messrs. Hornsby's* Five-armed "Spring-balance" (467 Catalogue number), taking a 5 feet cut with total breadth of 8 feet 1 inch, with controllable delivery. In this machine the main wheel is of 2 feet 10½ inches diameter; the axis of the rake motion is in line with the cutter-bar, the fingers and sections at 3-inch intervals, and the stroke of the crank with a downward thrust, 5¼ inches. Set to deliver by every fourth rake, some of the sheaves were well laid, but some spread very wide.

No. 8.—*Messrs. Hornsby's* Four-armed "Spring-balance" Reaper, (468 Catalogue number), with simple adjustable but not controllable delivery. The arms are independently hung by joints to the rake-wheel, or revolving carrier, and supported by rods from two collars or centres above. These rods are easily shifted by hand from one centre to the other,—hooking to the lower one causing the rake to deliver, and hooking to the upper one making the rake a gatherer; and the upper collar can be set in different positions by a rack and bolt, so as to alter the height of sweep of the gathering rakes over the platform. The delivery may be by every rake, or every second or fourth. In the trial it was set for every other rake. The rake-motion centre is in advance of the cutter-bar; and the platform is gently curved, so as to conform to the path described by the delivery rakes. The width of cut is 5 feet 3 inches, the fingers and knife-sections 3 inches, as in the other machines of this firm, and the travel of the knife 5¼ inches, and thrust downwards. As in all the Grantham reapers, the middle of the seat for the driver is placed about 3 feet 5 inches outside the driving-wheel, and about 2 feet 3 inches back from the line of its axis. In the trial there was one stoppage. There was entire freedom from any tendency of the rakes to strip out grain, or to press down ears in front of the knife.

No. 9.—*The Johnston Harvester Company's* "Wrought Iron Self-delivery" Reaper (378 Catalogue number). The machines of this Company have been already briefly referred to in the Report on the Philadelphia Centennial Exhibition.* This reaper is constructed on a singular principle; the cutter bar and platform being flexible, or floating at uniform height over the surface of the ground, almost independently of the vertical position of the main driving-wheel and frame carrying the pole and crank gearing, yet without employing two driving-wheels, as in the ordinary form of grass-mower. The stiff and yet light rolled angle-iron finger-bar forms, with the wrought-iron drag-bar, one rigid piece, in figure like a letter L; the forward end of the drag-bar is hung to the front part of the main frame, with a lever adjustment for raising or lowering, so as to alter the dip of the fingers, while the heel or junction of the drag-bar and finger-bar is supported by a chain instantaneously set by another lever to any height of cut. A peculiar feature in this machine is the use of two parallel extension bars, one above the other, for connecting the heel or angle of the finger-bar and drag-bar with the outer side of the main frame, which is mounted upon the driving-wheel,—this parallel motion allowing the finger-bar and platform to be raised or lowered, and at the same time preserving the upright position of the main wheel and its frame. Thus, as the machine is not raised and lowered upon the main wheel, all heavy brackets, stud or hollow axes, and screws or other appliances for adjusting are avoided, and the main frame is exceedingly light. The crank shaft is placed outside the main wheel, which is of three feet diameter, and the connecting-rod passes behind this wheel. To allow for the variable angular position or tilt of the finger-bar, a universal joint is provided at the crank-pin end of the connecting rod, and a ball and socket joint at the end taking hold of the knife-bar. The fingers are at 3-inch intervals, and this distance is also the extent of travel of the knife. Two speeds are provided, being very simply effected by reversing a double-bevel pinion side for side. The width of cut is 5 feet, and the breadth over all 8 feet 11 inches; but the platform can be folded upright for travelling. The off-side is carried by a castor wheel, easy in turning, and this is fitted with a very clever contrivance for ready raising and lowering. The delivery-motion axis is carried upon the drag-bar, and preserves always the same position relative to the finger-bar and platform attached. It is driven by a chain-gear, and the five arms are adjustable as gatherers or deliverers by a change of pinions on the gear which actuates the switch movement on the cam.

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* See p. 13.

In the trial every fourth rake was set as a deliverer, some of the sheaves were well laid, but many with wisps or tails lying across the butt ends. One stoppage was occasioned by a stone, and another occurred in crossing a furrow.

No. 10.—*Messrs. Hornsby's* Five-armed Controllable-delivery "Spring-balance" Reaper (463 Catalogue number). In this machine the driving-wheel is of 2 feet 6 inches diameter, with 8-inch plain tire; the width of cut is 5 feet 3 inches, and breadth over all 8 feet 2 inches. The crank, with thrust of connecting-rod upward, and the gearing are similar to those of the machine No. 469.

In the trial the delivery was at first by every fourth, and then changed to every third rake,—making a moderate delivery, in some places much littered or trailed between sheaf and sheaf. Some ears were cut off on the north side of the plot. This was in a very thick and good part of the crop, guessed at six quarters yield per acre, and very heavy indeed to stand. One stoppage occurred from the near wheel running in a low furrow, and bringing the fingers and knife too close to the ground.

The Self-delivery Reaper (2453 Catalogue number), exhibited at Birmingham by *Messrs. Richard Bickerton and Sons*, of the Old Tweed Implement Works, Berwick-on-Tweed, having been broken by an accident, did not appear at the trials.

Of the ten machines tried in Class 1, the Judges decided to select six for second trial, namely, Messrs. Hornsby's machines, Nos. 469, 466, 467, 464, and 463, and The Johnston Harvester Company's Reaper, No. 378.

The second trial of these selected machines was made on Wednesday and Thursday, August 16th and 17th, in a good crop of barley, about 2½ feet long in the straw, with some places laid, and made awkward cutting by bineweed.

On the first half-acre plot in this field Messrs. Hornsby's Six-armed Machine (No. 469), without controllable delivery, made exceedingly good work in every respect, being set with every third arm raking off, working with a very even and smooth motion, though the sheaves were too small.

Next came Messrs. Hornsby's Six-armed Machine (No. 464), with controllable delivery, the rake-centre in line with the cutter-bar, and 2½-feet driving-wheel; it cut exceedingly well, and made an equally good delivery by every fourth rake.

On the third plot in this barley was run Messrs. Hornsby's Five-armed Machine (No. 463), with 2½-feet main wheel, and controllable delivery, the rake-centre placed in line with the cutter-bar, but high above the ground. Both cutting and delivery of the soft 2-feet long straw were very well done. It was splendid work, though this was a difficult plot to cut.

Plot 4.—Messrs. Hornsby's Five-armed Machine (No. 467), with larger main wheel and controllable delivery, with rake-centre placed 4 inches backward of the cutter-bar, and 6 inches lower than in the six-armed machine (No. 464). The delivery was set by every third rake. Excellent cutting was performed, and the sheaves were well laid; but from attempting to cut too close to the ground, several stoppages ensued, and the crank-plate was found loose.

The Johnston Wrought-iron Reaper (No. 378), with five rakes, every fourth delivering, deposited the sheaf-bunches tolerably well, though the platform is too near the ground; and the man caused it to carry the cut stuff round the corners neatly and effectively. But the cut was too high, and, in fact, was considerably fagged and not well done.

On the last plot in the barley was tried Messrs. Hornsby's Six-armed Reaper (No. 466), with large driving-wheel and controllable delivery, the rake-centre placed 3 inches behind the line of the cutter-bar, and 4 inches nearer the ground than in the six-armed machine (No. 464). Delivering by every fourth arm, this machine dropped better-laid sheaves than did the American machine, and the bunches were carried round the corners at the option of the driver. The cut was superb, being low, close, even, and perfect; and no barley-heads were decapitated, although the machine passed through portions of the crop much laid, and in spots bound with weed. One stoppage occurred in this trial.

An observation made, comparing this machine with the Johnston Reaper, will explain one cause of the light draught registered by the latter machine in the dynamometer trials.

Both machines make 8¾ cuts for each yard advance, or, in other words, the advance is 4·1 inches per single stroke or cut; and in both the distance between the fingers, centre to centre, is 3 inches. The effective depth of the knife-sections, or of the notches exposed for cutting, is in the Johnston machine 1⅞ inch, and in the Hornsby machine 1⅝ inch—not a very great difference; but the length of stroke of the crank and knife-bar is only 3 inches in the Johnston machine, while it is 5½ inches in the Hornsby machine; that is, each knife-section in the former cuts across one interval between two fingers, while in the latter it cuts across two intervals between three fingers. The effect is, that the Grantham reaper makes two clips in the same time that the American reaper makes one. By reversing a pinion, a quicker speed can be given to the crank in the Johnston machine, when the advance is only 2·8 inches for each stroke or cut; and this might have cut the barley efficiently. But the slow speed used in the barley was the one subjected to the dynamometer test, in which this machine showed rather the lightest draught, namely 3·20 lbs. per inch-width of cut, while the lightest Hornsby machine had a draught of 3·36 lbs. per inch-width of cut. That the quicker speed, if tried, would have considerably increased the draught, may be inferred from the example of Messrs. Bickerton's Combined Reaper and Mower, which is furnished with two speeds; the draught in cutting wheat was, with the slow speed, 3·42 lbs., but with the quick speed 4·22 lbs. per inch-width of cut.

A final run of machines in this class was made on Monday, August 21st, all operations having been stopped by heavy rains on the Friday and Saturday. This was over a heavy piece of wheat, very tangled, with green at bottom. Here the Hornsby machines performed well, in spite of the damp condition of the corn, and had no difficulty in delivering. The Johnston reaper was worked at first with the quick speed on the crank-gear, rattling, however, considerably; and in the latter part of the trial, when the crop was drier and where it was freer from weeds, the slow motion was returned to and the cutting was well done.

The superb workmanship and the perfection of design, fitting, and finish observable in every part and minute detail of Messrs. Hornsby's machines (not to mention the finishing touch given to them in the way of colour, the red being artistically picked out with relief-tints and lines, and brilliance added by the silver-bronze on the rods, chains, and other metal-work) were subjects of universal remark; and their excellence of construction, even more than actual performance through the necessarily brief trials, swelled the number of points gained in the Judges'

Table of merits,—the highest attainment being 957 points out of 1000 constituting perfection.

The Judges awarded the first prize to Messrs. R. Hornsby and Sons' Six-armed Machine, with controllable delivery and small main wheel (No. 464); the second prize to Messrs. Hornsby and Sons' Five-armed Machine, with small main wheel, but not controllable delivery (No. 463); and the third prize to Messrs. Hornsby and Sons' Six-armed Machine, with controllable delivery and large main wheel (No. 466). They highly commended Messrs. Hornsby and Sons' Six-armed Machine, with controllable delivery (No. 469); and also Messrs. Hornsby and Sons' Five-armed Machine, with controllable delivery and large main wheel (No. 467); and they commended the Johnston Company's Wrought-iron Self-delivery Reaper (No. 378).

CLASS 2. *Reaping Machines with Self-delivery in Swathe clear of the Horse Track.*—There were four entries in this class; three horse-power Machines, and Messrs. Aveling and Porter's Reaper attached to a locomotive steam-engine; and the preliminary trial in Field No. 1, of generally upstanding ripe red wheat, was made on Monday and Tuesday, August 14th and 15th.

Messrs. R. Hornsby and Sons' Six-armed Sheaf-delivery Machine, without controllable rakes (471 Catalogue number), was set with every rake delivering, thus operating as a swather. In the run there occurred one stoppage, from a stone being caught against the crank connecting-rod. The cutting was well done, and the swathe of strong but short straw was tolerably laid.

The next tried was *Messrs. Hornsby's* Swather, a left-hand machine, worked by a pair of horses walking alongside the standing crop, as in the ordinary sheafing-machines, but with the cutter-bar in a line more backward than the main driving-wheel, the swathe being delivered in the rear of that wheel from a slanting platform, and the corn bent down over the knife and platform by a rotating reel. To the pole is fixed one iron shaft, on the side next the crop, and a whipple-tree on the other side; so that the machine works with the steady guidance due to the yoking of one of the horses in this pair of shafts. The seat for the driver is placed in a dangerous position, directly in front of the main wheel and gear. The total breadth of the machine over all is 8 feet 4 inches for a cut of 5 feet, and the driving-wheel is of 2 feet 6 inches diameter, with 9-inch broad plain tire; to which, however, biting-irons can be attached at pleasure. The main wheel is mounted upon a cranked-axle frame or bracket, which is adjustable by screw-rack motion to different heights; and the intermediate-motion axis, driven by pinions and an annular toothed-wheel inside the main wheel, passes through the socket-bearing or centre by which the crank-axle bracket is connected to the main frame of the machine, and so drives the crank-shaft, which is outside the frame. The connecting-rod passes behind the main driving-wheel. The off-wheel, of 12 inches diameter, with 6-inch wide tire, is mounted in the fork of a lever placed under the far-side of the sloping platform, and is set higher or lower instantly by means of this lever. For ease in following different directions the wheel is hung upon an axis considerably longer than the breadth of the wheel, and two spiral springs inclosing the axis, one on each side the wheel, hold it in the mid-way position.

The axis is made hollow for lubrication. The board-platform is not only set up at an acute angle, but is so placed in a retreating position that the delivery side next the main wheel is somewhat further back from the knife than on the off-side; and the cut corn falling upon this platform is passed off sideways by three horizontally traversing endless chains made with projecting spikes or pins at intervals. The throat or space of irregularly triangular figure, through which the swathe is delivered, measures 5½ feet along the slope of the platform, and averages about 2¼ feet depth; which is insufficient for the passage of long-strawed bulky wheat. However, a swathing-machine is wanted chiefly for short-strawed crops and barley. The reel, supported by an ash-frame, carries six bars or blades, describing a circle of 8 feet 4 inches diameter; and these blades move with a speed a trifle faster than the rate of advance of the machine, thus very gently pulling back the standing corn upon the platform. The reel is driven by a chain.

In the trial this reaper deposited a prettier swathe than that of the six-armed sheafer; but still the stuff in the 3½-feet wide swathe was left crossed and locked to some extent. In the over-ripe crop the reel knocked out a small quantity of the grain.

The Beverley Iron and Waggon Company (Limited) of Beverley, Yorkshire, competed with their "Improved Three-horse Reaper, with double self-acting or reversible swathe-delivery" (3150 Catalogue number). Both in the fundamental idea and the mode of construction this is an entirely British machine; but it has been so altered in details of late years, that there may be said to be little remaining now of the original invention of the Rev. Patrick Bell beyond the principle of the horses following directly behind instead of in advance at one side of the machine. The general form of the reaper is shown in the drawing Fig. 5, where *a* is the main driving-shaft, *b* the intermediate shaft for driving the crank, *e* the finger-bar and knife, *f* the rollers carrying the traversing belts for delivering the cut corn, *g g* the endless bands, *i* a lever for reversing the bevel-gear, which reverses the action of the delivery-rollers, *j* the reel or fan for bringing the corn forward to the platform, *k* the rigger for driving the wheel, and *l* the pair of land-wheels for regulating the height of cut. The frame is of wood; two straight wood-shafts or poles project horizontally from the back of the machine, 11 feet 3 inches in length, 3 feet 3 inches apart, and at a height of 2 feet 10 inches from the ground, though adjustable vertically according to the pitch at which the machine is set; and these carry at their extreme ends a cross-bar with hake, to which the whippletrees are hung; and a steering-lever, which stands out on either side according as the standing corn is on the right or left. By this lever, with a couple of handles, a man following on foot steers the machine like a Bedfordshire drill. The three horses are yoked thus—one between the two poles or shafts, and one on each side, with their heads towards the machine; and they can back the machine by their collars being hung by chains to the main frame. Turning round at the end of the field is rather awkward for horses unaccustomed to it; but in the trial the Earl of Warwick's fine team of Suffolks managed to turn in one minute and a quarter.

The two wood driving-wheels are of 2 feet 10 inches diameter, with 4½-inch broad plain tires; and the two smaller wheels under the platform are of 12 inches diameter, with tires also 4½ inches broad. The main spur-wheel reaches within 4 inches of the ground. It being unavoidable to place the crank behind—and in this machine 12 inches behind—the knife-bar, the crank is made to reciprocate a strong T-piece; the foot of the T being connected with the knife-bar, while the round-bar cross-head parallel with the knife-bar slides

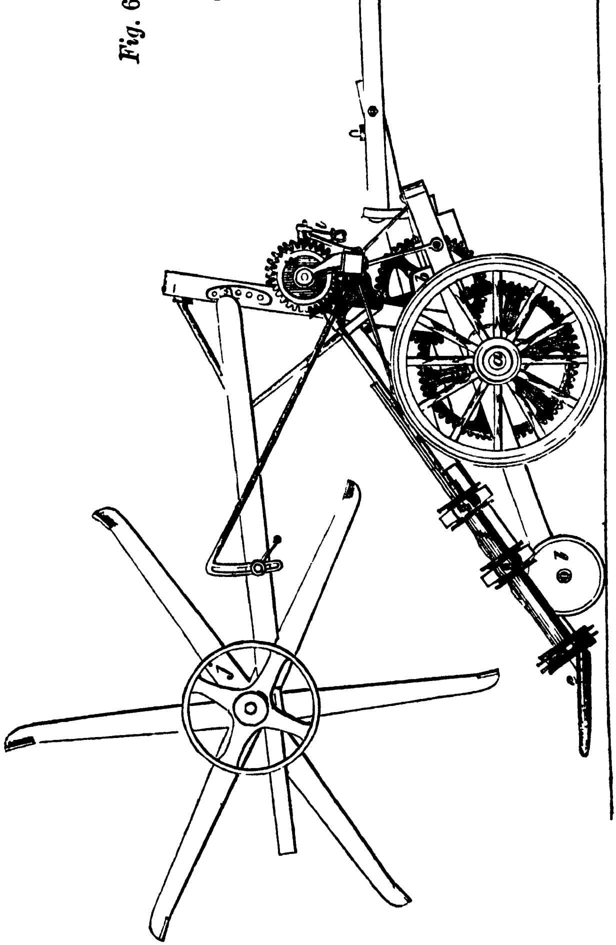


Fig. 5.—*Side Elevation of The Beverley Iron and Waggon Company's Three-horse Reaper.*

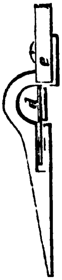


Fig. 6.—*Section of Finger and Knife.*

in two broad steel bushes 24 inches apart, these being situated 15 inches behind the knife-bar, while the crank connecting-rod takes hold of the stem of the T-piece 3 inches nearer. In this way the friction is reduced to very low limits. The throw of the self-lubricating crank, and consequent travel of the knife-bar, is 3 inches; the knife-sections, which may be plain or serrated, are of the same breadth; the fingers also are at 3-inch intervals, and the effective depth of the notches exposed in the knife for cutting, is 1½ inch. The width of cut is 7½ feet; that is, the same breadth per horse as in Messrs. Hornsby's swather; but the width of the whole machine, out to out, for going through a gateway is only 8 feet 9½ inches, or 5½ inches wider than the Grantham machine. The peculiar form of the over-neck finger is shown in the section (Fig. 6), in which *e* is the finger-bar, and *d* the knife-bar, with knife-section above it. The fingers are made of wrought iron in the centre, with steel outside; thus securing the greatest amount of toughness and strength, with sharp cutting edges, to the slots through which the knife-sections shoot. The cut can be set within 4 inches of the ground.

The reel, driven by a strap, carries six blades, which describe a circle 6 feet diameter; and while in the trial the movement of the blades was a little faster than the rate of advance of the machine; a change of speed is provided by replacing pinions for accommodating the motion to long or short strawed crops. The axis from which both the reel and delivery motions are driven is actuated by a pitch-chain, which can be tightened up when requisite by an eccentric provided for the purpose. The cut corn is delivered off the sloping board-platform on either side by a traversing chain behind the finger-bar, and two traversing india-rubber belts higher up, armed with small wood lugs or teeth set at wide intervals, the passage off the platform being aided by a clearer-bar or lath, extended sideways and slided out to different distances according to the length and condition of stuff to be deposited in swathe. The mouth, or space which the swathe has to pass through, is not confined in front, and up the slope of the platform it measures 5½ feet, with an average depth of about 3 feet.

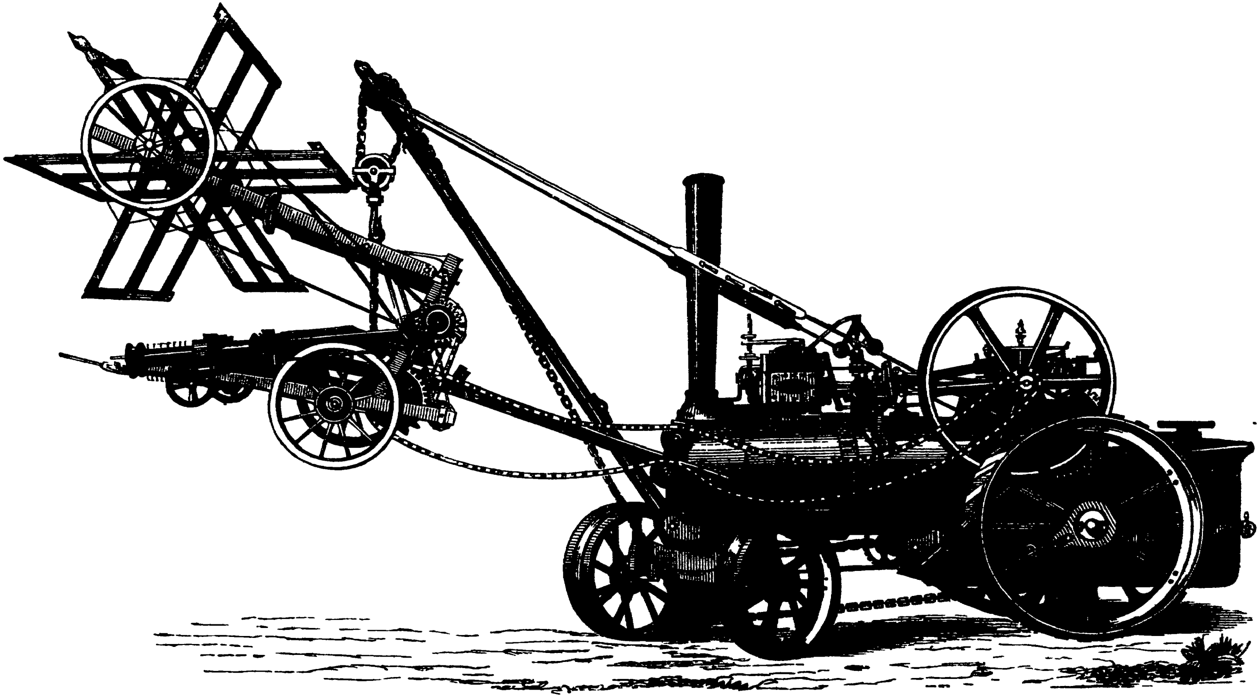
In the first trial, the Beverley machine, worked with a man to drive the horses, in addition to the steersman following (possibly a man and lad would be sufficient in the farmer's harvest-field), cut at first a 5-inch to 6-inch stubble, and afterwards a 4-inch to 5-inch stubble. The swathe was beautifully delivered in every respect; and the machine was turned end-for-end after each course, working always up and down the same side of the plot, in turnwrest fashion, delivering in the same direction as the lay of the crop. A man cleared a few yards' area at each end for turning. Of course the machine is equally well adapted for cutting all round, or on two or three sides of a field; but it can justly claim this exclusive feature, that it is independent of scythe-men, seeing that, as exemplified in its cutting of roadways and opening out of all the plots for the Leamington trials, it may be driven anywhere, in straight lines or otherwise, through the standing corn, beginning a field without any previous preparation by hand-labour. Taking a breadth of 7½ feet, it will also clear a considerably greater number of acres per day than can be cut by any other machine worked at the same pace.

In a second trial of the horse-power swathers on Saturday, August 19th, heavy rain stopped a run of the Beverley machine in the heavy, laid, and tangled wheat, as the wet stuff could not be delivered. On Monday, August 21st, the Judges being anxious to test the advantage claimed for this machine of special capability for dealing with laid crops, made the condition that competitors should cut this tremendous piece of wheat in any way, all round or on any side, or, in fact, as they chose or as they could. And more than this, they expressly desired the representative of the Beverley firm to examine the crop closely, in order to determine upon the best way of tackling it. The performance was not such as to enable the Judges to value the machine as highly for swathing as they had been able to value machines in Class 1 for sheafing; and though the Beverley reaper proved itself by far the best in Class 2, the total number of points which it gained still fell so far short of what constituted perfection, that only the second, instead of the first prize, was awarded to it, the other prizes being withheld for want of sufficient merit in either the Hornsby swather, or the Hornsby six-armed sheafer used as a swather.

On reference to the Tables, it will be seen that the draught of the Beverley reaper per inch-width of cut was 3·86 lbs., very little more than the 3·49 lbs. draught of the Hornsby six-armed sheafer used as a swather; while the draught of the Hornsby swather was 4·63 lbs. per inch-width of cut. And it is to be remembered that, from the manner in which the dynamometer test of the Beverley machine had to be made, an excess of the true draught must have been registered. For mechanical points, the Beverley machine took 480, and the Hornsby swather 420, out of 575 constituting perfection; and for performance, the Beverley machine took 375, and the Hornsby machine 320, out of 425 constituting perfection. The total points for the Hornsby swather were 740, and for the Beverley machine 855, out of 1000. This carried only the second prize; and comparing this with the awards in Class 1, Sheaf-delivery Machines, it is to be observed that the commended machine there gained 835 points, the two highly commended reapers took 908 and 924 respectively; while the third prize was carried by 925 points, the second prize by 938, and the first prize by 957 points.

The great novelty of the occasion was the Steam Reaping Machine of Messrs. Aveling and Porter, of Rochester, Kent (Catalogue number 2120). As represented in the illustration, Fig. 7, this is a combination of one of Aveling & Porter's wonderfully powerful and handy road-locomotives (carrying a crane-jib in front), with a propelled reaping machine constructed

Fig. 7.—*View of Messrs. Aveling and Porter's Steam Reaping Machine, in position as when turning at the ends of the field.*



on the principle invented by the Rev. Patrick Bell, in Fifeshire, as long ago as the year 1826. Of the engine, it need simply be said that it is made with all the improvements peculiar to the engines of the Rochester firm; the bearings of the crank-shaft, countershaft, and driving-axle being carried by the side-plates of the fire-box casing, extended upwards and backwards for the purpose; the cylinder placed in a forward position above the boiler, and the steerage worked promptly, easily, and securely by the well-known chain-and-barrel motion. The crane is worked by a chain passing under the fore-carriage boiler and fire-box to a barrel with brake placed under instant command of the engine-driver just above the fire-door. The engine is of 8-horse nominal power, and weighs 8 tons. Two angle-iron bars connect the forward or smoke-box end of the engine with the rear of the reaping machine, with a distance of 6 feet between; and while the bars are so attached to the reaping-machine frame as to be adjustable to different vertical angles by means of wedge packing, they are coupled to the engine by a bolt passing through their ends and through the smoke-box, forming a joint, so that the machine is free to rise and fall in travelling over uneven ground independent of the changes in the level of the engine; and by means of the crane the reaping machine can be lifted altogether, and carried high enough to clear any gate-posts of reasonable height. The reaper, manufactured by Messrs. W. Crosskill & Sons, of Beverley, Yorkshire, takes an enormous cut, no less than 12 feet wide, the total breadth of the machine being 13 feet 9 inches. The old form of finger of the Bell reaper is retained; that is, not the original scissor clips, but fixed fingers at 3-inch intervals with 3-inch broad knife sections, with a stroke of the same length. The T-piece by which the crank connecting-rod is united with the knife-bar reciprocates through three collars or guides, 3 feet 9 inches apart. The wood main wheels, of 2 feet 9 inches diameter, with plain 4-inch-wide tires, are employed only as supports, and not to drive the mechanism; this being accomplished by a long pitch-chain from a pinion on the engine crank-shaft to a wheel upon the main driving-axis of the reaper. For supporting the upper and lower plies of this chain in position, both when the reaper is in work and when it is elevated for turning round at the ends or for travelling along a road, two friction or guide rollers are mounted upon that angle-iron bar which is on the same side as the chain. The reel is formed with six fans or blades; and the throat or space at the side of the platform through which the swathe has to be delivered measures 6 feet up the slope of the platform, with an average height of about 3 feet. Though the breadth of cut is 12 feet, the endless-bands for delivering traverse across the 12-feet wide platform at the same speed, that is, at the same rate of feet per minute, as in a horse-power narrower machine; and the knife also is driven at the same speed in proportion to advance as in the horse machine. The knife being driven by the engine instead of from the travelling wheels which, in the case of a horse machine, will slip on the land and allow the knife to stop suddenly when jammed by a stone, it was necessary to provide a weak place somewhere as a kind of safety-valve against a severe accident; and therefore the knife sections are lightly riveted. There is no arrangement for throwing the reaping machine in and out of gear.

In the first trial upon the ripe upstanding wheat, the steam reaper surprised onlookers by the easy and confident manner in which it entered the field with the machine heaved high over the gate-posts and hedges, advanced to the plot on the far-side of the field, and cut up and down courses, cutting clean and low a breadth averaging 11 feet and delivering a very good and well laid swathe. Measuring 30 feet in length, the combined engine and reaper turned round end for end in little more than this radius:—effecting this right-about movement by first steering forwards into a position at right angles to the first direction, and then backing for another right angle. In practice the engine would begin by cutting three breadths at each end of the field to get a clearance for turning in. The time occupied in turning was 1¼ to 1¾ minute, or 2½ minutes at intervals, when the driver purposely stopped for firing, nine turnings being accomplished in 16 minutes. With steam at 100lbs. pressure, reduced in the latter part of the trial to 80lbs., with an early cut-off, the pace in work was 100 yards advance in 1¼ minute. This rate of performance, including the turnings, is about 2½ acres per hour, or, say, 30 acres in a harvest day.

Two men only are required; and as the engine brings into the field in the morning a four-wheeled combined water-cart and coal-cart holding 700 gallons of water, which is enough for a day's consumption, and sufficient coal for a day's consumption, the steam reaper is entirely independent of horses.

On Friday, August 18th, the steam reaper had a field-day on the farm of Mr. Garner, four miles from Leamington, on the Tachbrook Road. Here the engine had to contend with a heavy wheat crop on a hill-side, presenting inclines of about one in ten or twelve, and this with the ground wet from the drenching rain which both preceded the trial and proceeded with it. In fact, the soil became a thinnish layer of loose slippery mud upon a hard bottom not yet moistened by the downfall; so that there was not adhesion enough to have enabled the wheel of a horse-power reaper to drive the gear, and the steam reaper cut and delivered only because the mechanism was driven directly by the engine and was independent of skidding wheels. It was weather in which reaping by ordinary machines was impossible; but on all sides of the field, except ascending the steepest gradient, the steam reaper proved itself able to cut. Mr. Aveling, with that indomitable energy and fertility of resource for which he is famous, would not be overmastered by even the steep slippery ascent, and by means of spikes on the wheels on the Friday, in the absence of biting-irons which were not available till the next day, succeeded in demonstrating the ability of the engine to climb up the greasy incline without burying the wheels, carrying the reaping machine with her. This was a trial under extremest difficulties; but both here and in the first trial, where the work was exceedingly well done, enough was shown to prove the correctness and practicability of the principle of combining a Crosskill reaper and crane-jib farm locomotive in the manner invented by Messrs. Aveling and Porter. An estimate of the cost of working was not made. It is evident that the working-expense of an 8-horse engine in cutting, say 30 acres per day, must be considerably less than that of the number of horses in relays which would be required for executing the same area of cutting in the same time; but comparative economy is a small consideration beside the advantage of such vast expedition as adding by steam power 25 to 30 acres of reaping per day to the extent already commanded by the horse power on the farm. That an 8-horse power locomotive shall be purchased for sole use in cutting down corn during one or two harvest weeks in a year is not proposed by anybody; the interest and depreciation upon first cost would be far too heavy for such a small amount of time engaged. The capability to perform reaping by a locomotive engine becomes, however, of great importance in relation to the extension of steam cultivation. For one main source of profit from the adoption of a steam plough consists in the displacement of the costly power of horses; the more farm operations you can execute by means of the tillage engine, the larger is the proportion of horse teams you can dispense with; and with your one or two ploughing engines put to the cutting of all your corn, your carting of the harvest with the smaller force of horses remaining may be as rapid as before.

The Judges recommended the Council to award Messrs. Aveling and Porter the Gold Medal of the Society for this important, well-conceived, practically worked out, and at the same time still promising invention.

Class III. *Combined Reaping and Mowing Machines without Self-delivery.*—The first trial of the combined machines was in a good crop of upstanding red wheat.

Plot 1. *Messrs. R. Hornsby and Sons'* "Manchester" Mower (476 Catalogue number), with two driving-wheels having ribbed tires, the finger-bar in advance of the wheels, with a small runner-wheel supporting it, and the draught-rod yoked to the forward part of the tilting frame which carries the finger-bar. The width of cut is 4 feet 3 inches, the total width of machine 8 feet 5 inches, but the bar is turned up for travelling. The driver's seat is placed in the rear of the near-side wheel, and the seat for the rake-man is in advance of the axis and between the main-wheels. The fingers are at 3-inch intervals, and the throw of the crank is 2⅝ inches; the effective depth of the notches between the 3-inch knife-sections is 1⅝ inch, and the machine advances 2⅒ inches for each cut. The length of the crank connecting-rod is 22½ inches. To change the mower into a reaper, it is necessary to take off the grass track-board; attach an off-wheel; put a divider on the off-side shoe, the side-board ending in an inclosing plate where it is attached to the shoe; put on an ear-lifter, add a grate or tipping-platform of wood slats at the back of the finger-bar; place the rake-man's seat; attach a sheet-iron shield for the driving-wheel; change the speed of the driving gear for the crank, and slip the pole-plate and driver's seat on the bridge to a position nearer to one side. One horse in shafts worked this machine in the trial, the driver walking; the delivery was by manual rake and grate tilted by foot; and good work was done, the half-acre plot being finished in 35 minutes.

Plot 2.—*Messrs. Brigham and Co.'s* "Buckeye Junior" Machine (383 Catalogue number). This is the same machine with which the firm competed at Taunton. The cut is 4 feet 9 inches. There are two driving-wheels with ribbed tires, and a floating or flexible finger-bar in advance of the wheels. The driver's seat is supported by springs, this being shifted backward in changing the mower to a reaper. A divider is bolted on to the outer end of the finger-bar, and a tipping-slat platform attached for delivery by treadle. The knife-sections are of 3-inch breadth, with 2 inches effective depth of the notches for cutting. The fingers are at 3-inch intervals, and the knife reciprocates from finger to finger, the machine advancing 2 inches for each single cut or stroke. In a nice upstanding crop, this machine cut, for the most part, close and well; and the manual delivery was good. One stoppage occurred from the driving-wheels crossing a furrow, the knife running upon the earth in front; and in a second stop from the same cause, a stone was caught and jammed in the knife, breaking the top of a finger.

Plot 3.—*Messrs. Hornsby's* "Paragon O" Machine (473 Catalogue number), the same which won the first prize as a mower at Taunton; with tipping-slat platform, driving-wheel shield, and change of speed: attachments for reaping similar to those described for No. 476. This combined machine, with 4 feet 3 inch cut, 3-inch knife-sections, and connecting-rod 11 inches long, was worked by one horse, the driver walking. The cutting was perfect, and the manual delivery of the good upstanding crop was very good.

Plot 4.—*Messrs. Lewis and Lowcock*, of the Salopian Iron Works, Shrewsbury, the "Emperor" Combined Reaper and Mower (1030 Catalogue number). This has two driving-wheels with ribbed tires, a cut 4 feet 3 inches wide, and a tipping platform and divider are added to fit it as a reaper. The change from the fast to the slower speed in the crank driving-gear is effected by turning an eccentric boss or centre on which one of the pinions is hung. The driver's seat is in a tolerably safe position. The knife-sections are 3 inches broad, with an effective depth for cutting of 2⅛ inches; and the number of strokes in proportion to the rate of advance is so high that one cut is made for each 1½ inch of advance. This machine, with a 4 feet 3 inch cut, worked by two horses, finished its plot in 46 minutes, but made inferior cutting. The delivery is not aided by tipping the platform by the rake-man's foot, but by the platform being hung with a counterpoise weight and yielding to the downward pressure of the weight of the sheaf-bench and the thrust of the delivery-rake. The sheaves were not laid so well or with such square butt-ends as when the grate is dropped by the foot, nor did the platform gather up so neatly for carrying the next sheaf as with a pedal-delivery.

Plot 5.—*Messrs. Lewis and Lowcock's* Left-hand Machine (1027 Catalogue number), with 4 feet 3 inch cut; breadth over all of 8 feet 4 inches; pedal-delivery by tipping grate-platform, but only a single speed for the crank-gear. The plot was completed in 36 minutes, in moderately good style; and it was observed that the rake-man's position was such that one of the driving-wheels chafed his clothing.

Plot 6.—*Messrs. Lewis and Lowcock's* Light Machine (1031 Catalogue number), with pedal-delivery, and the draught-iron yoked to the tilting-frame. The work was tolerably well done.

Plot 7.—*Messrs. Alfred Field & Co.*, of New Edmund Street, Birmingham, "Sieberling Excelsior" (American) machine, (764 Catalogue number). This machine takes a cut 5 feet 2 inches wide, with a breadth over all of 10 feet 0½ inch; it has 3½-inch knife sections, with serrated edges, downward thrust of a very long crank connecting-rod, two driving-wheels of 2 feet 9 inches diameter, and a four-bladed reel with provision for raising and lowering the reel axis while the machine is in motion. When the platform is tipped for depositing the sheaf, a horizontal transverse rod above the stuff is dropped by the same movement into such a position as to catch and hold up for an instant the cut stuff falling backward toward the platform, till the under sheaf-bunch has passed clear off. On raising the platform again, this rod is lifted simultaneously. The action of this rod and the reel together are designed to do the work of a rake-man, thus dispensing with one workman, while all is performed by the driver, who rides. The machine cut badly; the sheaves were square-ended, but the stuff was trailed to some extent on the side next the standing crop. There occurred also some breakages; for however good the ideas embodied in this reaper, the construction is much too frail for contending with bulky crops. In fact, a mechanic criticising this invention, spoke of it as "begotten, not made."

Plot 8.—*Messrs. Alfred Field & Co.'s* "Miamisburg Excelsior" machine (763 Catalogue number) has a lever to raise the cutter-bar, and a reel and a drop-bar or separator acting in conjunction with the tipping-platform. The cut is 5 feet 7 inches. In 39 minutes the half-acre plot was finished; but the cutting was very badly done where the crop lay away forward from the machine; indeed, this made the worst performance of any during the trial.

Plot 9.—*Messrs. Richard Bickerton & Sons*, of the Old Tweed Implement Works, Berwick-on-Tweed, "Buckeye A 1" combined reaper and mower (2454 Catalogue number). This has a cut of 4 feet 6 inches; breadth over all of 8 feet 10 inches; floating finger-bar of cast-steel, in advance of the two driving-wheels of 2 feet 8 inches diameter, with ribbed tires; and this bar is lifted at the heel or inner end by a lever, and at the outer end by setting a small eccentric at the joint. The finger-bar is turned up for removing the connecting-rod. A very simple method of changing the two speeds of the crank driving-gear is provided,—the first motion shaft being slided sideways, bringing a lesser or greater pinion in gear with greater or less intermediate pinions, which are cast in one piece and driven by an internal wheel on the main driving-wheel. There is no reservoir for oiling. The fingers are at 2¾-inch intervals, and the throw of crank 3½ inch. The cutting was close and good; and the manual delivery (defined to be "delivering by the foot"), with grate platform, was very good.

Plot 10.—*Messrs. Hornsby's* "Paragon A" machine (474 Catalogue number), taking a 4 feet 3 inch cut, with $2\frac{9}{16}$-inch fingers, and $2\frac{5}{8}$-inch throw of crank, was worked by one horse, the driver walking. It cut exceedingly well, and also made a good delivery by grate-platform tipped by pedal.

Plot 11.—*Messrs. Brigham and Co.'s* "Star Combined Reaper and Mower" (384 Catalogue number). This is a lighter machine than No. 383. The width of cut is 4 feet 4 inches, and total breadth over all 8 feet 6 inches; the fingers are at 3-inch intervals, and the throw of the crank 3 inches. The finger-bar floats, or, in other words, is free to rise and fall at both ends; and when fitted as a reaper, a tipping grate-platform is added and worked by the rake-man's foot. With two horses and two men, this machine made good work, finishing the half-acre plot in 38 minutes.

Plot 12.—*Messrs. Hornsby's* light "Paragon N" machine (475 Catalogue number), which won the third prize at Taunton, has a $4\frac{1}{4}$-feet cut, total breadth $8\frac{1}{4}$ feet; fingers at 3-inch interval, and the throw of the crank $2\frac{5}{8}$ inches; worked by one horse in shafts and two men, with pedal grate-platform delivery. This machine made very good work.

Plot 13.—*Messrs. Hornsby's* small "Paragon One-horse combined Mower and Reaper" (477 Catalogue number), with a cut only 2 feet 9 inches wide, and breadth over all of 6 feet $5\frac{1}{4}$ inches, was worked by one horse in shafts. It was amusing to see Messrs. Hornsby's substantial man Trolley riding on this little machine and cutting four drills at once; but the half-acre plot was cut and delivered in 58 minutes—a rate of performance of say 6 acres per day.

Out of the 13 machines, the Judges selected for trial upon grass Messrs. Brigham and Co.'s No. 384; Messrs. Lewis and Lowcock's No. 1031; Messrs. A. Field and Co.'s No. 764; Messrs. Bickerton and Son's, No. 2454; and Messrs. Hornsby's, Nos. 473, 474, 475, and 476. The crop was ryegrass, heavy and laid. Messrs. Hornsby's No. 476 met with a specially bad piece, under the trees which overshadowed part of the half-acre plot No. 1. Messrs. Hornsby's No. 475 had two stoppages. Messrs. Lewis and Lowcock's mower, on Plot 3, encountered a rough tangle and a sewage-carrier, but elsewhere it did not make very close cutting. Messrs. Field and Co.'s machine, fitted with its short cutter-bar for grass-cutting, did a small portion of its work fairly; but the largest part of the plot was poorly done. After a considerable fall of rain, the remaining machines were put through their trial. Messrs. Hornsby's No. 473 dealt with a heavy crop much knocked about; but the grass was well cut and well laid, the mower, in finishing up, cutting part of the last course over again. Messrs. Hornsby's No. 474 made a rather ragged cut. Messrs. Bickerton's No. 2454 missed a great deal of grass; the swathe was also very badly laid, and the gearing became choked up. Messrs. Brigham's No. 384 missed cutting in places.

The Judges awarded the first prize, 15*l.* to Messrs. Hornsby and Sons' "Paragon O" (No. 473), which gained 995 points out of 1000 constituting perfection; the second prize, 10*l.*, to Messrs. Hornsby and Sons' "Paragon N" (No. 475), which

gained 980 points; and the third prize, 5*l.* to Messrs. Hornsby and Sons' "Paragon A" (No. 474), which took 965 points. They highly commended Messrs. Hornsby and Sons' "Manchester" machine (No. 476), which took 933 points. Messrs. Lewis and Lowcock's machine (No. 1031) gained 675 points, of which 245 were for performance; Messrs. Brigham and Co.'s machine (No. 384) gained 635 points, of which 280 were for performance; Messrs. Bickerton and Son's machine (No. 2454) took 615 points, of which 315 were for performance; and Messrs. A. Field and Co.'s machine (No. 764) took 570 points, of which 270 were for performance.

CLASS IV. *One-Horse Reaping Machines.*—Eight machines were entered in this class; but the competition was between seven, Messrs. Brigham and Co.'s reaper being disqualified (as already intimated) for exceeding 33,000 foot-pounds per minute of draught.

On Plot 1, in the 20-acre field of red wheat, was tried *Messrs. R. Hornsby and Sons*' Spring-balance One-horse Reaper" (482 Catalogue number), constructed with three self-delivery rakes, and taking a cut 3 feet 3 inches wide. The fingers are at 3-inch intervals. With the controllable-delivery set to gather with three arms and deliver the sheaf by each fourth arm in succession, exceedingly good work was performed with the labour of one man.

Plot 2, the One-horse "Yorkshire Champion" Reaper of *Mr. William Mattison*, of Leeming Bar, Bedale, Yorkshire (572 Catalogue number). This left-hand machine, with manual back-delivery, is of simple, strong, plain construction, the framing of wood, and most of the gearing inclosed against dirt and grit in a wooden box which forms the seat for the rake-man. The main wheel is of 2 feet 5 inches diameter, with plain 6½-inch-wide tire. The fingers of malleable cast iron, case-hardened, are at 2¾ inches intervals; the throw of the crank is also 2¾ inches, and the machine advances 3·64 inches for each cut. The width of cut is 4 feet, and the total breadth over all 6 feet 7 inches. Mr. Mattison, one of the most expert men that ever handled a rake, made with his machine moderately good work in this first trial, employing two men.

Plot 3.—*Messrs. Hornsby's* "Premier" Reaper (479 Catalogue number), with iron frame and wood shafts, 2-feet 6½-inch driving-wheel, crank driving-gear inclosed within this wheel, crank connecting-rod 18 inches long, finger-bar in advance of the main wheel, fingers at 3-inch intervals, and the throw of the crank carrying each knife-section across two finger-spaces. The breadth of cut is 4 feet 3 inches, back-delivery by grate-platform tipped by pedal, and the seat for the rake-man is over the wheel. With two men this machine made good work.

Plot 4.—*Messrs. Hornsby's* "Spring-balance" One-horse Reaper (481 Catalogue number), with fingers at 2½-inch intervals, 3-feet cut, and self-delivery by three rake-arms. In the bright upstanding wheat, though heavy at top, this machine, set to deliver by every third arm, did well, but not equalling the work of No. 482. The shorter throw of the crank tends to lessen the draught; but this was not much lighter than in the case of No. 482, owing to the sheaves being delivered in quicker succession.

Plot 5.—*Messrs. Hornsby's* "Premier" Reaper (480 Catalogue number), with 2 feet 6½ inches main wheel, fingers at 2½-inch intervals, throw of crank 4¾ inches, crank connecting-rod 17 inches long, lever for raising the finger-bar, 4-feet cut, and manual back-delivery. Employing two men, this machine cut well, and the delivery was especially well done. In the middle of the plot the crop was lighter than the average.

Plot 6.—*Mr. William Mattison's* "Yorkshire Champion" Reaper (573 Catalogue number) made good work.

Plot 7.—*Messrs. Hornsby's* "Premier" Reaper, with manual back-delivery (478 Catalogue number), has the brackets and gearing placed on the inner side of the main wheel, but not within it; the crank connecting-rod is 17 inches long, the downward throw of the crank 5½ inches; the fingers are at 3-inch intervals; the width of cut 4 feet; breadth over all 6 feet 8 inches; the main wheel is of 2 feet 6½ inches diameter; the seat for the rake-man is over the wheel, and there is a lever for raising the fingers. This machine, employing two men, dealt with the heaviest portion of the crop.

The Judges selected for a second trial the two Grantham Self-delivery One-horse Machines, Nos. 481 and 482; the Grantham Manual-delivery Reaper, No. 479; and Mr. Mattison's Manual-delivery, No. 572. These were tested upon a piece of heavy barley on Thursday, August 17th. The Hornsby machines performed well; Mattison's also cut well, and, with hard and very nimble execution on the part of the rake-man, delivered well, keeping four men busy at work in shifting the sheaf-bunches out of the way for the next course.

In the dynamometer trial on wheat, the two self-delivery machines showed a draught of 4·0 to 4·4 lbs. per inch-width of cut; which, considering the shorter breadth taken at once, compares not unfavourably with the 3·3 to 3·6 lbs. draught of the two-horse machines made by the same firm. Of the two manual-delivery reapers, Messrs. Hornsby's had a draught of 1·89 lbs., and Mr. Mattison's 2·23 lbs. per inch-width of cut. The draught of these, running light on a farm-road, was, for Hornsby's "Premier," 32 lbs., and for Mattison's "Manual," 53 lbs., which is 5 lbs. more than the draught of Hornsby's Self-delivery One-horse Machine, No. 482.

The Judges awarded the first prize of 15*l.* to Messrs. R. Hornsby and Sons' Self-delivery One-horse Reaper, No. 482, which gained 625, that is full points, for mechanical merit and price, and 368 out of 375 points for performance, making 993 total points out of 1000 constituting perfection. They gave the second prize of 10*l.* to Messrs. Hornsby's Self-delivery One-horse Reaper, No. 481, which gained 600 out of 625 points for mechanical merit and price, and 346 out of 375 points for performance, making 946 total points out of 1000. The third prize of 5*l.* they awarded to Messrs. Hornsby's Manual-delivery Machine, No. 479, which took 570 out of 625 points for construction and price, and 355 out of 375 for performance, making 925 total points out of 1000. And they highly commended Mr. William Mattison's Manual-delivery Reaper, which took 485 out of 625 points for construction and price, and 310 out of 375 points for performance, making 795 total points out of 1000 representing perfection.

MISCELLANEOUS IMPLEMENTS AND INVENTIONS.

The Judges of Miscellaneous Implements and Inventions were —Mr. John Hicken, of Dunchurch, Rugby, Warwickshire; Mr. John D. Ogilvie, of Mardon, Cornhill, Northumberland; and Mr. John Thompson, of Badminton, Chippenham, Wiltshire. They made the awards subject to the following regulations laid down in the Prize Sheet, namely:—

"1. The Judges are requested to observe, that, in addition to the specified Prizes, there are Ten Silver Medals, which they have the power of awarding in case of sufficient merit.

"2. These Medals cannot *in any case* be awarded to any implement included in the ordinary rotation, unless (1) it belongs to the classes for which prizes are offered at this Meeting, or (2) the principle on which the implement is constructed be entirely new, and the implement never before exhibited at any of the Society's Shows.

"3. These Medals are specially intended as a mark of approval of any new principles of construction which the Judges may consider as *essential improvements*; subject always to the restriction contained in Rule 2.

"4. The Judges are also empowered to make special awards of Medals for efficient modes of guarding or shielding machinery, especially when worked by steam, from contact with persons immediately engaged in attending to such machinery while at work.

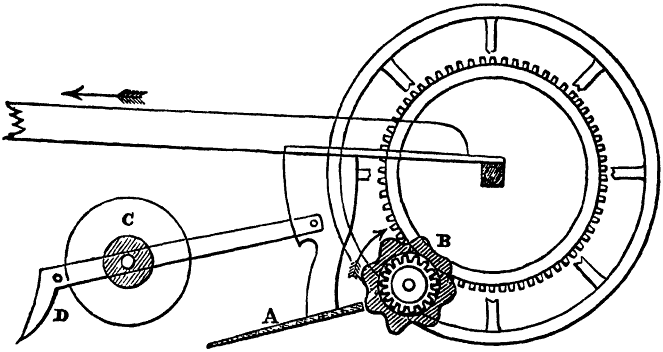
"5. No Medal shall, in any case, be awarded to any implement or miscellaneous article capable of trial until it has been subjected to such trial as the Stewards may direct.

"6. No Medal shall be awarded by the Judges without the consent of the Stewards, and no commendation of miscellaneous articles shall be made by the Judges."

But though a considerable number of novelties and improvements were selected and recommended for medals, the Stewards withheld their consent to the awards, excepting in three cases; deciding that certain of the inventions were not agricultural, while others were not new, and others, again, did not possess merit sufficiently marked to call for special distinction in the Society's distribution of honours.

A silver medal was awarded to Messrs. J. W. Robinson and Co., of 125, St. Anne Street, Liverpool, for Aspinwall's Patent Potato Digger. This is not a plough with a breast of prongs, or a plough with rotary fork following, but a machine with a revolving extractor or separator driven by spur gear from the travelling wheels. There is a pair of wheels, with main frame between them, having a central draught-pole and a seat for the driver, after the fashion of a grass-mower. Our (ideal not true mechanical) section (Fig. 8) will give a general idea of the arrangement and action of the parts. The frame supports by a strong coulter-arm the share A, which passes under the ridge or row of potatoes, raising the tubers and the soil together; and the mass is broken and separated in passing backward over a cylindrical cage B, revolving on a transverse axis in the direction shown by the arrow. The cage consists of rings with indented or waved circumference, set at intervals along the axis; or there may be two sets of rings, large and small alternately, the inner cage being driven at a higher speed than the outer one, as was the case in the machine tested at Birmingham. Thus the outer cage lifts and partially separates the earth and potatoes with a comparatively gentle motion, leaving a thorough riddling and removal of the potatoes from the soil to be completed by the more rapidly rotating cage within. A roller, C, of dice-box or hollowed form like the roller of a turnip-drill, presses down the tops or vines in advance of the share, being carried between two arms with gathering prongs, D, at liberty to rise and fall according to the height of the potato row. In the trial at Birmingham the machine was not once choked by the haulm, which was rank and green, but cleaned itself admirably, and the tubers were not at all bruised. The draught appeared to be easy; and, in fact, the trial was a success. The price, 20*l.*, was not deemed excessive.

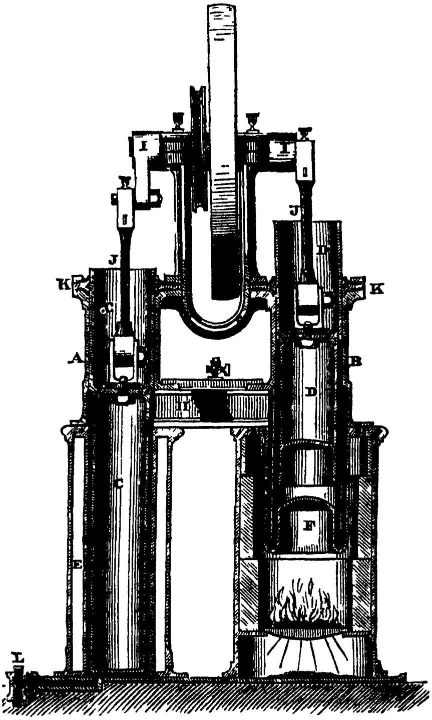
Fig. 8.—*Section illustrating the action of Aspinwall's Potato Digger.*



A silver medal was awarded to Messrs. Hayward Tyler and Co., of 84, Upper Whitecross Street, London, for their Caloric Engine.

As may be understood by the sectional cut (Fig. 9) given, the engine consists essentially of a compression-cylinder A, and a power-cylinder B, with their respective pistons C D, and connections, and a regenerator H. The lower portion of the compression-cylinder A is kept cold by a current of water which circulates through the cooler E, which surrounds the lower portion of the cylinder, while the lower portion of the power-cylinder is kept hot by the action of the fire below the heater F. The heating and also the cooling of the air are instantaneously effected by its alternate presentation to the surfaces of the heater and cooler, in a thin annular sheet, such being found by experience to be the only correct method of rapidly and thoroughly effecting changes of temperature in air.

Fig. 9.—*Vertical Section of Messrs. Hayward Tyler and Co.'s Caloric Engine.*



This is accomplished as follows:—The compression-piston C extends downwards to the base of the engine, and is a trifle smaller than the interior of the cooler E, thus leaving a thin space on all sides for the air to pass downward and become thoroughly cooled on its way to the bottom, and through which space it flows on its way back to the heater. The power-piston D likewise extends downwards into the heater F, which in shape resembles the bottom of a champagne-bottle; that is, rising in the centre, and presenting to the action of the fire a narrow annulus all around the bottom. Within this heater is the telescope G, which is a thin iron cylinder, about one-fourth of an inch less in diameter than the interior of the heater. It is fitted to the interior of the power-cylinder B, and extends nearly to the bottom of the heater. Its office is to cause the air which flows from the compression-cylinder to be presented in a thin sheet all around the interior surface of the heater, and particularly at the lower and hotter portion. By this means the air is thoroughly and rapidly heated. The same air is used continuously, as there is neither influx nor escape, the air being merely shifted from one cylinder to the other. Between the compression and power-cylinders is situated the regenerator H, the economical value of which cannot be overrated. This regenerator is composed of a number of thin plates, slightly thickened at their edges, which, while affording a free passage to the air, subdivides it into thin sheets. It is so placed between the cylinders as to be traversed by the air in its passage each way between the hot and cold cylinders. Thus the heat is alternately abstracted from and returned to the air in its passage backwards and forwards through these plates, imparting great economy and steadiness of power to the engine. The other portions of the engine are readily understood on inspection of the cut. The two pistons are attached directly to the crank I I (which stand at an angle of about 95° from each other, the crank of the power-piston being in advance), by simple connecting rods, J J; and all the movements of the various parts are uniform, being solely derived from regular, circular, and rectilinear motion; and as there are no complicated parts, and none of the irregular intermittent impulses which characterise caloric engines, a high rate of speed and smooth action may be safely and easily obtained. K K are the packings which are in duplicate for each cylinder. The lower one has its lap downwards to resist the escape of air below the piston, while the upper one has its lap upwards to prevent the lubricating material from entering too freely into the cylinders. Between them is the relief-ring, which is so constructed as to almost entirely relieve the friction of the packings. L is a simple check-valve which supplies any slight leakage of air which may occur. It is generally placed at the back of the engine, at the lower part of the compression-cylinder, but is necessarily shown in the sectional cut on the side.

The operation of the engine is briefly as follows:—

The compression-piston C first compresses the cold air in the lower part of the compression-cylinder A into about one-third its normal volume, when, by the advancing or upward motion of the power-piston D, and the completion of the down-stroke of the compression-piston C, the air is transferred from the compression-cylinder A, through the regenerator H, and into the heater F, without appreciable change of volume. The result is a great increase of pressure, corresponding to the increase of temperature, and this impels the power-piston up to the end of its stroke. The pressure still remaining in the power-cylinder, and re-acting on the compression-piston C, forces the latter upward till it reaches nearly to the top of its stroke, when, by the cooling of the charge of air, the pressure falls to its minimum, the power-piston descends, and the compression again begins. In the mean time the heated air in passing through the regenerator has left the greater portion of its heat in the regenerator-plates, to be picked up and utilised on the return of the air towards the heater.

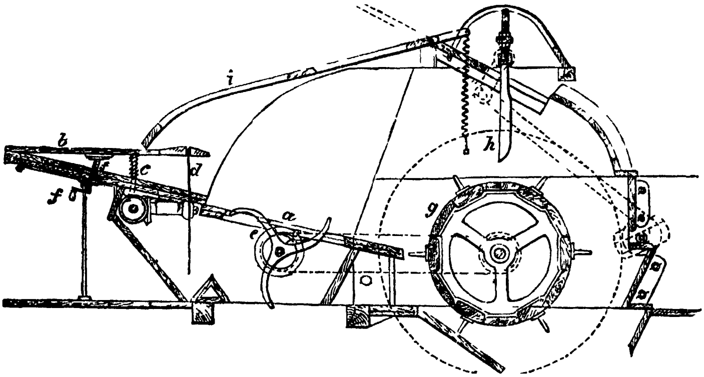
In the pumping-engines the whole of the water pumped is passed directly from the pump through the cooler, thus effectually and instantaneously cooling the heated air, which passes down the interior of the cooler on its way to the bottom. A very small pump is also furnished with the power-engines, which is attached like the large pump of the pumping-engine to the side of the cooler, and a small stream of water is injected with each stroke of the piston. This may be returned, if desired, to the barrel or reservoir from whence it is taken, until the water becomes in time too warm for effective use; or it may be allowed to run to waste, which is preferable where water is not too scarce, as the cooler the compression-cylinder is kept the better. Where a pressure of water can be obtained, the small pump may be disconnected if desirable, and a very small stream allowed to flow into the cooler and pass out at the opposite side.

For pumping a water-supply to farm-buildings, or for a gentleman's residence, and for innumerable purposes where only a small motive-power, say not exceeding two horses, is required, the caloric engine appears to be well adapted; being economical, safe, set to work with the least expenditure of fuel and in the shortest time, easily managed, needing little attention, and of comparatively low first cost.

A silver medal was also awarded to Messrs. Marshall, Sons, & Co. (Limited), of Gainsborough, Lincolnshire, for their band-cutter attached to the self-feeder of a threshing-machine.

In the section (Fig. 10) *g* is the revolving barrel of the self-feeder placed over the mouth of the drum, the barrel operating in conjunction with adjustable oscillating prongs, *h*, above it. A sheet-iron hood, *i*, is mounted on hinges over the feeding apparatus, and is held up by spiral springs in the position shown by the dotted lines. A person falling toward the feeder would shut down this hood into the place indicated in the drawing, and thus be saved from contact with the band-cutting apparatus *d*. Upon the feed-board *a* is hinged an upper moveable board, *b*, held up by a spiral spring, *c*; and when this is depressed by the weight of a sheaf upon it, a transverse slot in the board allows it to pass down clear of three small circular steel saws, *d*, which then project upwards through it. There are

Fig. 10.—*Vertical Section of Messrs. Marshall, Sons, and Co.'s Band cutter attached to the Self-feeder of a Threshing Machine.*



three of these saws, shown edgewise in the drawing, the axes placed so near together that the saws overlap each other, and the middle one revolves in a direction opposite to the rotation of the other two. The effect is that the sheaf band dropping upon the discs is cut asunder; when the loosened sheaf is caught by the revolving prongs *e* rising through the lower board *a*, and carried down to the feeder barrel *g*. When threshing corn not in sheaf, the belt driving the saws is taken off, and the upper board, *b*, is set in its highest position by means of the handle and screw *f*, forming thus a fixed table. The Judges considered this band-cutter to be simple and effective, and well worthy of the medal awarded. A workman has no difficulty in placing the sheaves with a fork on the upper board in the right position for securing the cutting of the bands, and he need not stand within five feet of the moving machinery.

Among the articles specially noted were the following:—

The Self-binder for a Reaping Machine (No. 1902), invented and exhibited by Mr. Walter A. Wood, of 36, Worship Street, London. This remarkably clever arrangement of novel mechanical motions and contrivances receives the swathe purposely raised upon a table, grasps enough for a sheaf-bunch, thoroughly separates the bunch from the loose swathe following, pinches the bunch tightly, passes round it a band of small but strong wire continuously run off from a reel with a constant and proper tension and taking up of the slack, couples the wire by a sufficient twisting, cuts it off, and delivers the completed firmly-bound sheaf. The Judges at Birmingham had no opportunity of seeing this apparatus at actual work in the field; neither did it appear at Leamington to compete for the Gold Medal of the Society which stands on offer "for an efficient sheaf-binding machine, either attached to a reaper or otherwise."

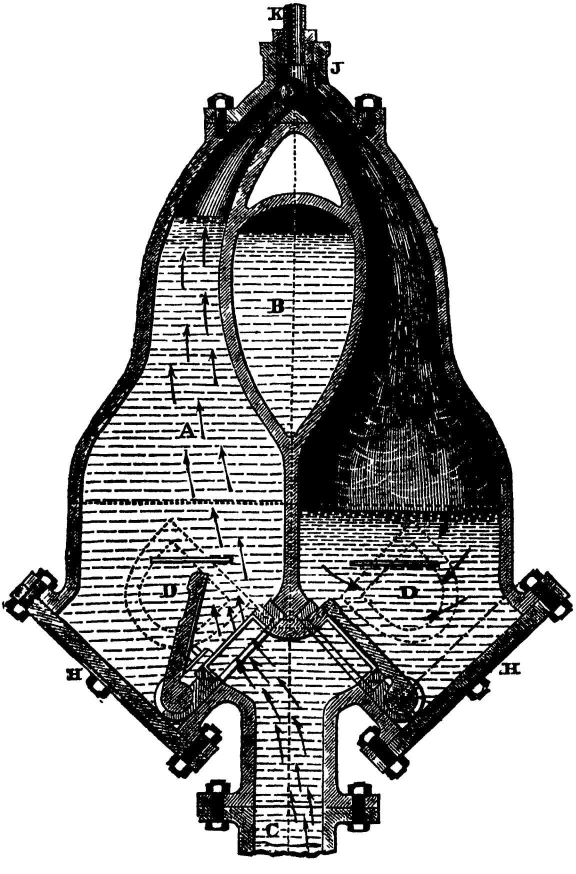
The "Suffolk" Patent Seed and Grain Cleaner and Separator of Mr. William Bone, of Framlingham (No. 675) was tried. The seed or grain operated upon runs in a thin stream down an inclined ascending woollen web, light seeds or grain adhering and riding up the web, while the round or heavy ones roll to the bottom, scrapers being provided to clean off adhering matters from the back ply of the web. It is adapted for separating wheat from tares, docks and plantain from clover, and for separating all kinds of seed corn; but failed to satisfy the Judges that its action is thorough and reliable.

The "East of England" Seed and Grain Cleaner and Separator of Mr. T. F. Stidolph, of Woodbridge (No. 2742), is a marvel of simplicity, seeing that it has no working parts whatever—neither wheel, axle, bearing, crank, roller, screen, or blower—beyond the adjustments necessary for opening and closing the mouth of the hopper. The grain or seed runs down a ladder of fixed louvre boards with spaces between; the principle being that while some grains or seeds bounce from board to board and others overleap the spaces by the impetus due to their weight, the lighter seeds and grains fall through; and wild oats and such seeds as have a hairy skin are caught and retained upon the boards, which are coated with cloth. Self-acting, simple, durable, and cheap, this separator did not, however, prove, in a trial with small seeds, that it is perfectly unerring in operation.

The "Acme" Silk Flour-dressing machine, of Mr. Richard G. Handley, of New Street, Birmingham, manufactured by Messrs. Lampitt and Son, of Warwick (No. 3532), has no central axis; but the rings of the cylinder run upon friction-wheels, and the longitudinal bars or ribs upon which the silk is distended are perforated, so that the flour is kept on the face of the silk instead of being carried partially round upon the ribs to fall upon the silk in heaps. The Stewards decided that this was not eligible for a medal, as not being properly an agricultural machine.

The "Pulsometer" Steam Pump, of Messrs. Hodgkin and Neuhaus, of 61, Queen Victoria Street, London (No. 5645), is an improvement upon the old principle of Savery's engine, in which water is raised by being expelled from a close vessel by the direct pressure of steam upon its surface, the vessel being refilled by condensing the charge of steam. In the "Pulsometer" (Hall's Patent), however, the condensation of the steam is effected, not by cooling the vessel either by an external shower or internal injection, but by causing the steam to come into sudden and intimate contact with the surface of the water after it has been depressed to a low level in the chamber. The action will be understood from the accompanying drawing (Fig. 11), which is a vertical section through the two chambers of the pump.

Fig. 11.—*Vertical Section of Messrs. Hodgkin and Neuhaus' "Pulsometer" Steam Pump.*



The "Pulsometer" consists mainly of a single casting called the body, which is composed of two chambers (A A) joined side by side, with tapering necks bent towards each other, and surmounted by another casting, called the neck (J), accurately fitted and bolted to it, in which the two passages terminate in a common steam-chamber, wherein the ball-valve (I) is fitted so as to be capable of oscillation between seats formed in the junction. Downwards the chambers (A A) are connected with the induction passage (C), wherein the inlet valves (E E) are arranged. A discharge chamber, common to both chambers, and leading to the discharge pipe (D) is also provided, and this also contains one or two valves, according to the purpose to be fulfilled by the pump. The air-chamber (B) is made in the same casting as the chambers, and communicates with the suction. In some instances it is divided by a diaphragm, and one portion communicates with the suction and the other with the delivery. The induction and discharge chambers are closed by covers (H H) accurately fitted to the outlets by planed joints, and readily removed when access to the valves is required. Small air-cocks are screwed into the cylinders and air-chamber for use, as will hereafter be described. These are the general outlines of the construction of the apparatus, and they are sufficient for the understanding of the nature of its operations.

The pump being filled, either by pouring water through the opening in the chamber, or by drawing the charge, is ready for work. Steam being admitted through the steam-pipe (K) (by opening to a small extent the stop-valve) passes down that side of the steam neck which is left open to it by the position of the steam-ball, and presses upon the small surface of water in the chamber which is exposed to it, depressing it without any agitation, and consequently with but very slight condensation, and driving it through the discharge opening and valve into the rising main.

The merit of the "Pulsometer" is in great measure due to the arrangements for preventing the steam from being largely condensed by contact with the water or other liquid which is to be pumped, during the emptying of the chamber. To this effect the peculiar form of the chambers greatly contributes; but it is also believed that the admission of air (through the air-cocks) which is afterwards somewhat condensed by the rising of the water, tends to prevent the intimate contact of the steam and water. That a successful result *is* produced is easily shown by the very small amount of heat which is imparted to the discharged water by the steam which has raised it.

The moment that the level of the water is as low as the orifice which leads to the discharge, the steam blows through with a certain amount of violence, and being brought into intimate contact with the water, an instantaneous condensation takes place, and a vacuum is in consequence so rapidly formed in the just emptied chamber that the steam-ball is pulled over into the seat opposite to that which it had occupied during the emptying of the chamber, closing its upper orifice and preventing the further admission of steam, allowing the vacuum to be completed; water rushes in immediately through the suction-pipe, lifting the inlet-valve (E), and rapidly fills the chamber (A) again. Matters are now in exactly the same state in the second chamber as they were in the first chamber when our description commenced, and the same results ensue. The change is so rapid that, even without an air-vessel on the delivery, but little pause is visible at the discharge opening, and the stream is, under favourable circumstances, very nearly continuous. The air-cocks are introduced to prevent the too rapid filling of the chambers on low lifts and for other purposes, and a very little practice will enable any unskilled workman or boy so to set them by the little milled nut that the best effect may be produced. The action of the steam-ball is certain, and no matter how long the pump may have been standing, it will start as soon as steam is admitted.

The steam-ball, if once made true, wears itself and its seats true, as it *turns in its bed* at every stroke, so that no part of its surface falls twice in succession upon its seat.

It is claimed for this pump that you cannot wear it out; that it requires no oil, tallow, or packing; that it wants no skilled attendance; that it occupies less space than any other pump; that it is cheaper than any other pump; and that it will pump almost anything,—as, for instance, water full of sand-grit and chips, mud, sewage, gas-tar, molasses, water mixed with grain, paper-pulp, oil, and (when made of suitable materials) acids of every kind. The Judges inspected the pump in operation, and considered it to be making satisfactory work and to possess very great advantages for special purposes and for low lifts, as compared with pumps having pistons or plungers; but as an economical application of motive-power, the principle of condensing steam at high pressure with no expansion cannot be commended.

The Steam-blast for Cleaning the Tubes of Steam-boilers, of Messrs. Brown and May, of Devizes (No. 5602), is a very simple, effective, and useful invention. There is no novelty in discharging an upward jet of steam in a boiler chimney to increase the draught; but the application in this case is such as to induce a current sufficiently violent to drive or sweep out the soot from the boiler-tubes. The steam is taken from the boiler near the fire-box through a 1½-inch pipe into the smoke-box, and the end opens upward into the chimney nearly on a level with the mouth of the pipe which issues the exhaust steam from the cylinder. When it is desired to cleanse out the tubes, the jet is turned on, a powerful blast is sent up the chimney, inducing a current through the tubes of such suddenness and force that the soot is cleared out and for the most part deposited in the bottom of the smoke-box. The action may take place at any time while the engine is at work, and this facility for frequently cleansing the tubes must secure a greater economy of fuel.

Henderson's Patent Mechanical Stoker, exhibited by Messrs. Piercy and Co., of Broad Street, Birmingham (No. 5785), presented an improvement in the mode of crushing the coal before it drops upon the rotating fans which cant the comminuted fuel upon the fire in evenly distributed portions.

In the Disintegrator of Messrs. Carter Brothers, of 82, Mark Lane, London (No. 5048), blades or beaters, sometimes rotating with a speed of 3300 revolutions per minute, shatter and pulverise the material to be ground in a case so formed that the meal is acted upon by repeated contact with the beaters. It is adapted for grinding, crushing, shredding, and pulping all kinds of feeding materials, grain, gorse, bean-haulm, oil-seeds, oilcake, and locust-beans; also bones and artificial manures. The Judges did not make a trial of this mill in comparison with others; but the drawback to its various advantages is the obviously large amount of power required to drive it in proportion to the work efficiently done.

Messrs. Clayton and Shuttleworth, of Lincoln, exhibited a Combined Threshing, Dressing, Straw-cutting, and Chaff-riddling Machine (Perkins's Patent), No. 5789. A chaff-cutter with five knives is fixed athwart one end of the threshing machine to catch the straw as it falls from the shakers, one man being employed to feed. Four blades upon the arms of the chaffcutter-wheel toss the cut chaff up to a perforated riddle placed under the collecting board and above the pulse riddle. The rough stuff is delivered among the pulse, and the cut-straw chaff bagged at the side of the machine. It is made for cutting three different lengths.

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I.—PERIODICALS PRESENTED TO THE SOCIETY'S LIBRARY.

Presented by the respective Societies and Editors.

A.—English, American, and Colonial Periodicals.

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Harens, W., J.P. South Australia: its History, Resources, and Productions. 1876. *Presented by the Agent-General.*

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JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

XV.—*Report on the American and Canadian Meat Trade.* By J. P. SHELDON, of Sheen, Ashbourne, Professor of Agriculture in the Agricultural College, Cirencester.

ALTHOUGH the subject of this Report is full of interest to British farmers, no one can pretend to indicate the extent to which the new meat trade will influence the production of animal food in these islands; nor can he say how far it will affect the prospects of British farmers. Predictions, as to the future of the interests involved in this question, are necessarily to a great extent mere conjectures; still we may obtain tolerably clear ideas of the *possibilities* of the new trade, by an examination of statistics and other information bearing thereon. The information which I now lay before the readers of this Journal has been gathered from a variety of sources in America and in England, and from personal investigation where possible. It embraces statistics bearing on the past and present of the trade, and inferences drawn by various practical men as to its probable development in the future. The former, I believe, are trustworthy; whilst the latter, probably, come as near to the truth as human predictions can well be expected to do.

Since the days when the repeal of the Corn Laws was advocated by the far-seeing men of that period, few things, if any, directly touching the interests of agriculture in this country, have been so widely discussed, or have produced in certain quarters so much apprehension, as the importation of American meat. Amongst the dairying and the meat-producing farmers of these islands, whose prospects are immediately affected by it, the subject of American meat produced, for a time, something closely akin to a "scare." And although the panic has now worn out its first flush of fever, and men can more calmly estimate the situation, yet a settled apprehension remains in many minds that British stock-farming may now be regarded as shorn of much of its present and of its former prosperity. This, I hope, will ultimately prove to have been a too gloomy view of the situation.

Strange to say, however, those who have most misgivings about the influence for harm which they suppose the American meat-trade will exert over their calling, are not the grazing so much as the dairying farmers. This may be taken to be well proved by the fact that barren cows, for grazing and fattening purposes, were higher in price last spring than in any previous one I personally remember. For this, two prime causes, at least, may be adduced: the diminution in number of cattle in these islands, as shown by the Agricultural Returns for 1875–6, and the prohibition placed on fat as well as store cattle coming from Germany, coupled with the then imminent prospect of war in the East—a prospect which was shortly realised. But cogent reasons against it, which might have been expected to tell, may also be adduced, viz. the presence of Rinderpest in the country—introduced, as in 1865, by fat cattle from Germany—the rapidly increasing importations of American meat, and the great advance which took place in the price of cheese in March and April. The fact, however, remains the same.

On the other hand, the price of in-calf cows was lower than in the previous spring; and this again is strange, in view of the advance of the price of cheese, and of the increased demand which arose in London for milk from the country—an increase principally caused by the number of cows which were slaughtered on account of the plague, in and around the metropolis. For some years past there has been a tendency towards grazing rather than dairying, principally with the view of keeping down the labour-bill and the general expenses of the farm; and this has tended to keep down the price of in-calf cows on the one hand, and to raise the price of barren ones on the other. At the commencement of the year it was predicted by some that these things would be reversed; they have not been so, and this seems to me to prove that the "plague of American meat," to a great degree, soon passed away from the minds of our farmers.

I have said above that it is dairy farmers who have now the most misgiving about the influence which the American meat will exert. They, in common with those who graze, have doubts as to the feasibility of bringing over much dead meat from America, and especially as to its being successfully distributed over this country in fresh condition, in summer time. But they no longer doubt that a practically unlimited supply can be sent over to us, and successfully distributed, in winter time. This last, they think, must inevitably hurt stall-feeding in this country; and that, consequently, barren cows, drafted in the autumn from the dairy-herd, which have commonly been in good demand for stall-feeding purposes, will in the future be hardly saleable at remunerative prices. If this be indeed the sequel, it will mean a distinctly diminished profit on dairy husbandry. The graziers, on the other hand, expect that they will have disposed of the bulk of their summer-fed beef and mutton before the American winter-supply can fairly set in, and that the new trade will not seriously interfere with their markets. It is, therefore, at present popularly supposed that stall-feeding farmers will suffer most from the American importation, the dairy-farmers next, and the graziers least of all. These assumptions are obviously based on the conjecture that the American meat must, to a great extent, stop coming in summer. Admitting for a moment that this conjecture may be true, it follows that the less they send us in summer the more they will in winter. And it will suit the American system of farming well, not to send us very much in summer; it is a simple matter for them to graze their cattle on through the summer, and as autumn approaches to commence feeding corn to them, soon "topping them up" into well-finished beef, admirably suited to winter exportation.

It is probable, however, that all these conjectures and inferences will prove in the future to be wide of the mark. Agriculture in England will be found to adapt itself to the new conditions more easily than many people think. If, as some say, we are up to the limit of meat production here, then there is room for the American meat to come in. When we consider that our population has increased during the present century from 10,000,000 up to what it is now, and if the estimate of the 'Times' come true—that it will be doubled in fifty-four years, and in five generations become 200,000,000,—then we may see reason to congratulate ourselves that there is American meat to fall back upon.

I have yet one more introductory remark to make: by the term "American," in this Report, I must not, in all cases, be understood to refer only to the United States; for Canadian interests (more particularly in the fresh meat, cattle, horses, &c., which come to us in winter-time) are so intermingled with those of the States, that when we speak of the one country we necessarily speak of the other, to a greater or less extent. I shall, however, as far as possible, treat of the two separately.

LAND RESOURCES OF AMERICA.

It has been longer the custom in America than in England to collect and publish official Returns of the area of land under cultivation or in farms, and of the number and variety of the live-stock owned by farmers. It is, however, probable, or at all events not improbable, that American Returns of this nature are less accurate than similar ones in England—not that the latter can by any means pretend to be strictly so. But this probability is obvious when we consider for a moment the vast disparity in size between the two countries, and the more scattered condition of the farming classes in America—especially in the Western States of the Union—thus making the collection of statistics more desultory and uncertain. But the Returns may, nevertheless, be accepted as approximating pretty closely to the truth; and it may at the same time be assumed that the machinery for collecting them is gradually approaching nearer to accuracy. I propose, in this division of my Report, to deal only with land and crops, leaving the cattle to be dealt with subsequently; and I take this question of the land first, because it is the prime factor in the production of food, and because it is a fixed and tangible quantity, so far, at all events, as area is concerned.

The prodigious resources of the United States, agriculturally speaking, are at once apparent in the following figures, which indicate the total area of the Union. The proportions of land in farms, and of land surveyed but not in farms, are from the Census of 1870. I give the statistics *in extenso*, because they possess great interest and importance in connection with the subject of the meat-supply, inasmuch as they illustrate not only the vast resources of the America of the future, taken as a whole, but also the present capabilities of those sections of the country which are said to be specially well adapted to the raising and feeding of stock.

The total superficial area of the United States and Territories is estimated by the Government statisticians to be 3,611,889 square miles. Referring to Table No. 1, we find that the acreage of land is computed by survey to reach the stupendous total of 2,311,544,959 acres! This includes, however, the mountains and forest-lands, but not the water-surface of the country. Compare this with the total acreage of land in the British Islands. We have here a total of 76,318,648 acres, including woods and forests; and the comparison between the two countries stands as one to thirty, leaving a balance in favour of America of 21,985,519 acres! Or, in other words, if the States and Territories were in thirty divisions, instead of in forty-eight, each of them would be larger than the whole of the British Islands. As they stand, however, six of them are each larger, Texas alone being considerably more than twice as large as Great Britain. (See Table I., p. 300.)

In the Statistician's Report of the Department of Agriculture for the year 1875, the area of land under crops is summarised as follows:—

	Acres.
Indian corn	44,841,371
Wheat	26,381,512
Rye	1,359,788
Oats	11,915,075
Barley	1,789,902
Buckwheat	575,530
Potatoes	1,510,041
Hay..	23,507,964
Tobacco	559,049
Cotton	10,803,030
Total acreage under crops ..	123,243,262

Deducting the foregoing total acreage under crops from the total area of land in farms, as given by the Census of 1870, we have a surplus in grass of 284,480,102 acres. This is, however, at present certainly below the mark, for, in the five years between 1870 and 1875, a large quantity of land, classed in the former year as "land surveyed but not in farms," was taken possession of by settlers, and more or less fenced in and cultivated—a larger area, in all probability, than the increase in the same period of land under crops, great as that was. Compare these figures with similar ones relating to Great Britain, and they come out in very bold relief. In the year 1870 there were in the United States and Territories a grand total of 407,723,364 acres *in farms*. In the year 1875 there were in the British Islands a grand total of 47,314,000 acres under all kinds of crops, and in grass, exclusive of heath and mountain pasture-land. Thus, in America, the area of farmed land is already more than eight-and-a-half-times as large as the area of farmed land in England, Ireland, Scotland, Wales, and the Channel Islands, all put together. Indeed, the area of land under Indian corn in America—within considerably less than three millions of acres—is equal in extent to the whole area under any system of cultivation whatever in the British Islands, be it green crops, cereals, or grass natural and artificial. And this disparity between the extent of farmed land in the two countries (supposing the extent of farmed land in Great Britain to remain as it now is) may, and in due time will, be increased until the proportion stands as *one* to *forty;* and this proportion, when attained, will leave in the United States over *four hundred and eighteen millions of acres* to be retained as forest or other land not devoted to agriculture.

In order to obtain a clearer idea of—for the next century or more—the practically boundless extent of country which the

TABLE I.—SHOWING the AREA of LAND in FARMS, of LAND SURVEYED but not yet in Farms, and of FOREST LAND in Farms and otherwise, in the UNITED STATES, in the year 1870, taken from the REPORT of the U.S. DEPARTMENT of AGRICULTURE for 1875.

States and Territories.	Number of Acres in Farms.	Number of Acres not in Farms.	Number of Acres in Total Area.	Number of Acres of Woodland in Farms.	Estimated Total Area in Woodland.
STATES.					
Maine	5,838,058	16,561,942	22,400,000	2,224,740	10,505,711
New Hampshire	3,605,994	2,333,206	5,939,200	1,047,090	2,213,693
Vermont	4,528,804	2,006,876	6,535,680	1,386,934	2,390,372
Massachusetts	2,730,283	2,261,771	4,992,000	706,714	1,460,619
Rhode Island	502,308	333,532	835,840	169,399	202,752
Connecticut	2,364,416	675,584	3,040,000	577,333	644,891
New York	22,190,810	7,889,190	30,080,000	5,679,870	8,309,600
New Jersey	2,989,511	2,335,289	5,324,800	718,335	1,496,764
Pennsylvania	17,994,200	11,445,800	29,440,000	5,740,864	11,463,764
Delaware	1,052,322	304,478	1,356,800	295,162	396,654
Maryland	4,512,579	2,606,781	7,119,360	1,435,988	2,739,378
Virginia	18,145,911	6,399,369	24,545,280	8,294,734	12,134,355
North Carolina	19,835,410	12,615,150	32,450,560	12,026,894	20,857,499
South Carolina	12,105,280	9,654,720	21,760,000	6,443,851	13,202,155
Georgia	23,647,941	13,472,059	37,120,000	12,928,084	22,358,525
Florida	2,373,541	35,557,979	37,931,520	1,425,786	19,204,775
Alabama	14,961,178	17,500,902	32,462,080	8,380,332	20,630,963
Mississippi	13,121,113	17,058,727	30,179,840	7,959,384	19,900,492
Louisiana	7,025,817	19,435,623	26,461,440	4,003,170	15,664,543
Texas	18,396,523	157,191,317	175,587,840	7,662,294	46,960,123
Arkansas	7,597,296	25,809,424	33,406,720	3,910,325	19,390,579
Tennessee	19,581,214	9,602,786	29,184,000	10,771,396	17,498,346
West Virginia	8,528,394	6,191,606	14,720,000	4,364,405	8,089,368
Kentucky	18,660,106	5,455,094	24,115,200	9,134,658	11,862,205
Ohio	21,712,420	3,864,540	25,576,960	6,883,575	7,270,029

Michigan	10,019,142	26,109,498	36,128,640	4,080,146	17,134,895
Indiana	18,119,648	3,518,112	21,637,760	7,189,334	7,541,145
Illinois	25,882,861	9,579,539	35,462,400	5,061,578	6,019,531
Wisconsin	11,715,321	22,796,039	34,511,360	3,437,442	7,236,781
Minnesota	6,483,828	46,976,012	53,459,840	1,336,299	9,165,634
Iowa	15,541,793	19,687,007	35,228,800	2,524,793	4,985,668
Missouri	21,707,220	20,116,780	41,824,000	8,965,229	19,023,619
Kansas	5,656,879	46,386,641	52,043,520	635,419	2,954,751
Nebraska	2,073,781	46,563,019	48,636,800	213,374	2,541,524
California	11,427,105	109,520,735	120,947,840	477,880	9,604,607
Oregon	2,389,252	58,586,108	60,975,360	761,001	15,407,528
Nevada	208,510	71,529,090	71,737,600	13,415	3,589,869
Total in States	405,226,769	869,932,271	1,275,159,040	158,867,227	402,048,717
TERRITORIES.					
Colorado	320,346	66,559,654	66,880,000	11,504	6,667,469
Utah	148,361	53,916,682	54,065,043	215	5,391,883
New Mexico	833,549	76,735,091	77,568,640	106,283	4,710,388
Washington	649,139	44,147,021	44,796,160	291,206	14,859,722
Dakota	302,376	96,293,752	96,596,128	22,605	2,911,417
Montana	139,537	91,877,103	92,016,640	1,198	14,701,534
Idaho	77,139	55,151,021	55,228,160	7,476	8,280,129
Arizona	21,807	72,884,433	72,906,240	..	4,373,065
Wyoming	4,341	62,640,727	62,645,068	35	5,011,293
Indian	..	44,154,240	44,154,240	..	3,532,339
Alaska	..	369,529,600	369,529,600	..	110,858,880
Total of Territories	2,496,595	1,033,889,324	1,036,385,919	440,522	181,298,119
Grand total	407.723,364	1,903,821,595	2,311,544,959	159,307,749	583,346,836

foregoing statistics represent, let us for a moment reduce our survey of America to the limits of one only of the thirty-seven States, and that one not the largest—Kansas. The area of this State comprises 52,043,520 acres (or several millions more than the whole of the farmed area of the British Islands), and of this only 5,656,879 acres were in farms in 1870; the rest being principally fine rolling prairie-land, covered with rich native grasses, and forming some of the finest natural pastures in the world. "The original forest-area of this State was quite small, and chiefly confined to the borders of the streams; on original prairies, forest-growth is increasing rapidly from two causes: the first is the arrest of prairie-fires by cultivation, which has resulted extensively in the spontaneous springing-up on uncultivated portions of a thick growth of young trees, which grow with wonderful thrift; the second cause is, the planting of forests, now doubly stimulated by legislative encouragement, and by assured success in respect to both growth and profit." * At present, however, only 11·2 per cent. of the State is in woodland. The increase of woodland will tend to an increased rainfall, which will in turn stimulate the growth of succulent grasses, and the effect of this change will be to improve the State as a grazing country. Government encouragement is everywhere held out for the planting of forests. Many other States, such as Colorado, Iowa, Wyoming, Nebraska, Texas, New Mexico, &c., might be described similarly; for each of them likewise possesses immense tracts of land, still unoccupied, which is said to be admirably adapted to the pursuit of cattle-raising and feeding; and this at a cost such as will enable American farmers to push their enterprise profitably, at present prices of meat, for generations to come.

In Kansas, cattle-raising is said to be a most lucrative business, the profits on some of the ranches being stated at 60 to 100 per cent. per annum. Many cattle raised in these Western States are drafted off into the Eastern ones, where they are fattened for consumption by Eastern populations. For some years this has proved in Kansas a most important trade.

Mr. N. P. Wisborg, of Odense, Allen County, Kansas, wrote to me under date April 16, 1877, as follows:—

> "Our grass is abundant and unsurpassed for fattening, and costs nothing (as it is not cultivated or occupied), and we have pure running streams of water. The cattle come up in October beautiful animals, and here again they are stall-fed, receiving all the corn (maize) they will eat. We select a spot, with water and wood adjacent, build feed-racks and troughs, and haul hay and corn with teams to the racks, &c. We get our hay as we get grass, for nothing, and whatever the cost is, is the work. Of course we have good ma-

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* Statistics of Forestry. Department of Agriculture. Report, 1875.

chinery, and, as the ground is smooth, we somehow have a wholesale way of running up stacks with horses, and haul them in winter to the cattle. Calves at six months old are bought for 24*s.*; one year old, 40*s.*; two years old, 72*s.* to 80*s.*; and three years old 6*l.* to 7*l.*. Our principal food for fattening in winter, in fact our only food, is corn (maize). The word 'corn' indicates nothing but maize. The milk of the cows, which the calves are not allowed to suck, is fed to hogs; and as the milk is very rich, owing to the cows receiving a large quantity of corn, the hogs thrive rapidly on it—faster than they would with corn alone. Pork at 2*d.* to 3*d.* per lb., gross weight, and fed in this manner, takes off a large share of the expense attached to the cows."*

From the foregoing it would appear that cattle are not considered sufficiently matured for slaughter until they are four or five years old. This coincides with a statement made to me by Mr. J. Augustus Lippincott, of Liverpool, who is the unloading superintendent on this side for J. C. Eastman and Co., of New York, who are, at present, the largest as they were for some time the only exporters of dead meat to this country. Mr. Lippincott informed me that the exporters were careful not to purchase for the English market any but well-fed and fully developed animals, four or five years old. Mere "beeflings," two to three years old, were avoided. Before the trade to England had provided a new outlet, the demand for these Western cattle had been only to supply the Eastern States and cities, and the supply far exceeded the demand.

The fee-simple of land in these Western States can be bought at prices varying from 4*s.* per acre upwards, the difference being governed more by the situation than by the quality of the land, nearness to a railroad being the chief consideration; this, of course, means land which requires fencing in, and on which there are no buildings or roads—land in its natural state, in fact. Land in such profuse abundance, cheap and good, provides the first requisite for the production of beef and mutton, and it is more than probable that the new and profitable outlet, which the exportation of meat to this country has provided them with, will give a powerful stimulus to the enterprise of the farmers of America. They possess natural advantages which will enable them to become, on advantageous and superior terms, competitors with the farmers of the British Isles in the production of beef and mutton. That they possess the necessary enterprise is abundantly proved in many ways already, notably in this last achievement of sending dead meat in a perfectly fresh condition, 3000 miles over the sea. The disadvantages under which they labour will be examined under the head of "Transit."

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* The prices given in English money have been calculated from those originally given, at the rate of 4*s.* to the dollar and ½*d.* to the cent.

An abundance of cheaply produced corn and general feeding stuffs gives the American farmer an immense additional advantage in the production of meat; and a great deal of the former which we have been in the habit of receiving from them, and which has already become indispensable to the rent-paying farmers of this country, will in the future come to us in the manufactured form of meat. Instead of sending us their cheap corn in such enormous quantities for us to turn it into animal food, they will to a great extent send it to us already converted into flesh. And from this new departure the American farmer will reap a double advantage: he will send us his converted corn at a smaller rate of freight than he could send it in its original form. Converted into animal matter, the carriage on it will be lighter than if it were sent as a vegetable production. The second advantage consists in the improvement which will accrue to the Western farms from the consumption on them of large quantities of corn in the process of fattening animals, as contrasted with sending the corn itself to this country. Hitherto a system of continual cropping and sending the grain to Europe, has tended in many portions of America to impoverish the land. In some of the Southern States, more particularly, this system has been carried on to such an extent that much land has been abandoned because it ceased to yield a remunerative return to the farmer.

With a view to stock-feeding, maize—or, as it is specifically termed throughout the States, "corn"—is the most important cereal grown. Sown early in May, this crop grows at a marvellous rate. In the first week of September I have seen it flourishing grandly, 10 to 15 feet high, so that a man on horseback could not be seen riding down between the rows of it. It is generally ripe by the end of September, but is commonly allowed to stand longer, until a frost or two have been on it, when it is said to "husk" the more readily. It is a crop easy of cultivation, and its value to the Western farmer is very great, a value which is enhanced on so much of it as can be turned into flesh. We have already seen that the estimated area under "corn," in the year 1875, was 44,800,000 acres; and, according to the same official statistics, the estimated yield from this enormous area of land, in the same year, was 1,321,069,000 bushels! Hitherto the farmer, owing to the limited demand for fat cattle, has not had much inducement to turn his corn into the more concentrated form of meat; but that the new trade in beef which has suddenly and successfully opened out will provide the lacking inducement, is now placed beyond a doubt. The freight on a car-load of cattle, say five tons, from Chicago or St. Louis to New York or Philadelphia, is about the same as on a load of corn; but the value of the load of cattle is far higher than the load of corn; hence it follows that the freight percentage, to the value of the load despatched, is correspondingly diminished.

The great belt of country situated between the parallel lines of latitude, 30° and 40°, and stretching across the great continent, provides for future use vast pasturages of fine land, much of which possesses the all-important advantage of a much finer and more genial winter climate than we are accustomed to in England. Mr. Henry Stewart of New York quotes from the 'Chicago Tribune,' as follows:—"The plains westward of Omaha (on the Missouri river) were in February clear of snow, and the grazing all along the Union Pacific Railway was splendid, with plenty of water." And he goes on, himself, to say,—"Let it be remembered that the whole country from the Rio Grande, the southern boundary of Texas, to the British boundary on the north, 1500 miles in extent; and westward from the Missouri for from 500 to 1000 miles, is either one grassy plain or luxuriant grass-covered valleys. Colorado is about the centre of this district. By and by all this vast pasture will be occupied by graziers with their herds of grade shorthorns. This is the competition that English graziers and farmers must inevitably meet."

Some Americans who write on this subject betray, unwittingly perhaps, a not unnatural undertone of exultation over the unexpected prospect which has recently opened out for the development of the resources of their great country. It must, however, be remembered that the summer-climate of America is not comparable to that of England for the grazing of cattle and sheep. It is far too hot and arid in many parts of the country. Many of the so-called "grazing-sections" become most years parched deserts, on which scarcely a green blade of grass is seen for months. We in England had a touch of this sort of thing in the summer of 1868. In the autumn of 1871, in the months of August and September, I travelled through New York, Ohio, and several other States, and I found our summer of 1868 there. Everything was dry, brown, and parched, except in some of the low-lying valleys, whose alluvial soils were well supplied with moisture from the rivers which ran through them. On inquiry, I learnt from the farmers that this was their usual fare. Nevertheless the cattle did not look amiss, they were acclimatised; but in the dry months the farmers largely resort to "soiling" their cattle with "green corn," and so manage to counteract the burning influence of the sun. It follows, then, that the Americans as a rule cannot compete with us in fattening cattle on grass, so far as climate is concerned; but the cheapness of both land and cattle with them more than counterbalances our climatic advantages. But in winter the advantages rest wholly with them, and it is for this and other reasons that we may expect their competition to tell most heavily against English farmers in the winter season.

In reviewing the land-resources of America I must not overlook the fruitful States of California and Oregon. Though placed on the far side of the great continent, some 3000 miles from the Atlantic Ocean, they are not too far away to influence in a greater or less degree the exportation, from the Eastern and Middle States, of dressed meat to Europe. Together they contain upwards of 200,000,000 acres, much of which is under a magnificent climate. In the production of the finest fruits of various kinds, California stands almost unrivalled. Besides being a celebrated grain-raising State, it is already becoming noted for its cattle and sheep; of the former it has 1,075,000, whilst of the latter it has one-third more than any State in the Union, viz., 6,750,000. There are some immense farms and cattle-ranches in California, of which the following extracts, copied from the 'Pacific Rural Press' of May 19, 1877, will give an idea:—

> "Dr. Glenn, of Colusa, has the reputation of leading in the line of grain-farming, and he has now 45,000 acres under cultivation. He is making calculations on a crop of 10,000 tons of grain, against 18,000 tons last year. He has already purchased 200,000 sacks to put the grain in."
>
> "Haggin and Carr, of Kern County, had 30,000 acres in their stock farm before they began operations under the desert land-law, and now they have, perhaps, as much more which they will bring under irrigation. The crops this season are, 2000 acres of barley, 1000 acres wheat, 175 acres corn, and 3000 acres alfalfa. The stock consists of 10,000 head of cattle, 20,000 sheep, 500 head of horses, and 1000 hogs. The working force at the present time is 625 men."

On the 20th of March last, a number of gentlemen met in the Granger Hall, San Francisco, for the purpose of making arrangements for the incorporation of a Fruit and Meat Shipping Company. The proposed plan is to establish slaughterhouses at some principal railroad shipping points; there to dress the meat, beef or mutton, and ship it in quarters in refrigerator-cars to San Francisco or the eastern markets. The capital stock was placed at 100,000*l.*, of which two-fifths were subscribed immediately. This company will send fresh meat to the Eastern States, and they in turn will send an increased supply to Europe. California's one great drawback—the same that so much reduces the agricultural value of many portions of the Western States—is its meagre and precarious rainfall. But for this it would be, perhaps, the finest and most delightful of countries. As it is, however, the droughts are commonly of long duration and terrible in severity; and it sometimes happens that farmers have to kill off a portion of their flocks and herds in order to save the lives of the remainder. Mr. Horace J. Smith, writing to me from Los Angelos County, California, under date April 16, 1877, says:—"Out here we have only had 3 inches of rain since last May, and we expect no more till next November. The cattle ranges are therefore arid and baked, and the herds of animals are being slaughtered for their hides and tallow. In spite, however, of this drought, the orange and vine are thriving; and as this region has a splendid 'climate attachment,' a large body of settlers is coming in." The planting of forests where needed, and a better system of farming, will in time modify this drought evil, but at present it operates frequently and disastrously. The climatic influence of America is illustrated by the disparity in the number of stock which the grass-land of that country carries, as compared with the British Islands. In the former country, in the year 1875, there were 148,680,327 acres of pasture and meadow land, exclusive of woodland; in the latter, 30,110,555, including rotation grasses. The following calculations show the number of horses (in America, horses and mules), cattle, and sheep, per 100 acres of land under grass:—

AMERICA.	ENGLAND.
7·49 horses and mules	9·26 horses
18·74 cattle	33·75 cattle
24·16 sheep	111·23 sheep

In the year above mentioned there were in America 11,149,800 horses and mules, 27,870,700 cattle, and 35,935,300 sheep. In the British Islands at the same time there were 2,790,851 horses of all kinds, 10,162,787 cattle, and 33,491,948 sheep.

One of the greatest pests of the American farmer, almost if not quite equal to the droughts in severity, is the grasshopper plague. These pests exist in myriads innumerable; they rise up in dense swarms, almost darkening the air. Here is a picture of Kansas farming, by the 'Scotsman's' Special Reporter, dated Salina, Kansas, May 23, 1877:—

"The part of Kansas I visited first was that intersected by the Central Branch Union Pacific Railroad, which runs from Atchison to Washington, a distance of over 120 miles. This district is well watered, and though the summits of the 'bluffs' or heights are bare and water-worn, it contains a great stretch of very fine soil—sandy loam, impregnated with lime, and ranging from one to three feet deep. Settlements are pretty numerous along the line, but still the main portion of the land is held by the railway company and land speculators, and is for sale at from one to five dollars per acre. The greater part of that held by speculators is land purchased from the Kansas Agricultural College at Manhattan (which received a large grant of land from the Government for support) and half-cultivated homesteads that have been deserted. Half-cultivated homesteads deserted! How does this happen? In a manner easily explained. A man with probably a wife and a young family, whose possessions and prospects at home may not be equal to the prospective demands of his family, is urged abroad to seek for a competence. He comes here and places himself on a Government section, or purchases a small piece of land.

He has probably just capital enough to secure the land, buy a light team of horses and the few necessary implements, build a shanty, find seed for a few acres, and maintain himself and his family till the first crop is reaped. The grasshopper plague, or a drought, visits his locality, destroys two-thirds or the whole of his crop, and leaves him destitute, or almost so. By mortgaging his meagre possession or by a loan from home he may be able to seed a few more acres for one more trial. Similar misfortune falls upon this crop, and at last in despair he sells his partially improved holding for a mere trifle and returns home, or moves elsewhere. I passed several homesteads having a history of this kind, and visited settlers alongside, who, as a rule, were young or middle-aged men with young families, and of very limited means. Most of them had been here for two, three, or four years, had had heavy losses by grasshoppers and drought, and (several of them at least) were now in such reduced circumstances that like misfortune for another year or two would swallow their last cent. One English settler said he had laboured here for three years and lost so much of the little he had to begin with, that another year such as those he had experienced would drive him off in despair, and quite penniless. Another settler, from the New England States, declared that no class of men with small means were making money, or even a comfortable living at farming in this locality save Swedes, and the secret of their success he explained thus:—'They take the good of everything. What the cattle won't eat they give to the hogs, and what the hogs won't eat they eat themselves. They are the dirtiest fellows on the earth.' A good many Germans emigrated here several years ago, and by clubbing together and by assisting and encouraging each other they have made tolerably comfortable homes, and are likely to make a little money forthwith.

"While partial or complete failure has been the fate of the majority of those who have attempted farming here with small means—probably not more than 200*l.*—nine out of every ten of those who commmenced three or four or more years ago, with a sufficiency of money to meet emergencies at the outset, are already receiving fair return for their capital, and have every prospect of realising moderate fortunes. It might be asked what would be a sufficiency of capital to purchase and farm successfully, say, 100 acres of land in Kansas? Less than 500*l.* would be too little. Good homesteads, unless at a great distance from railways, are mostly all taken up, and therefore land must be bought, and would cost at least 75*l.* A team of horses and harness would cost about 50*l.*, the necessary implements 100*l.*, stable and barn 15*l.*, and dwelling-house and furniture (of even moderate pretensions) 100*l.* No man could consider himself safe unless, after defraying all these preliminary outlays, and laying down the first crop, he had at least one-third of his capital untouched."

STATISTICS OF AMERICAN CATTLE.

Having examined the land resources by which America may in the future increase her production of animal food, I may now turn to the statistics of the animals themselves, an examination of which will, I believe, confirm what has been already suggested as to the vast agricultural possibilities of the great Continent of the West. The increase of cattle in the United States in the past thirty-five years has, as we shall presently see, been great and rapid. A continuance of this increase depends upon a sustained demand: facilities for it remain almost unbounded; the inducements only are, or rather were, wanting. The facilities are:—a virgin soil of first quality, covered with rich natural grasses, whose fattening properties are said to be of a very superior order; rich in all that make soils valuable to the farmer; situated under a climate whose winter is less fickle and rigorous than our own; land whose fee-simple purchase-money is about equivalent to what is paid per annum as rent and taxes of land in England. The inducements are of a purely commercial nature, and are governed by the laws of supply and demand. So, if the demand for them exists in England, the cattle will be produced in America.

In the year 1840 it was computed that there were 14,971,586 head of meat-cattle in the country; by the year 1850 they had increased to 18,678,582; and in 1870 they were estimated to number 28,678,582. Here, as it would seem, the maximum for the present was reached, the supply having exceeded the demand; and the natural consequence of excessive production now intervened. The cattle diminished in value first, and then in numbers. In the two years following 1870, there took place a considerable decrease in numbers, which was continued, though to a less extent, yet another year. After this the cattle began to rapidly increase again. The numbers are given as follows:—

In 1870	there	were	28,678,582
„ 1872	„	„	26,989,700
„ 1873	„	„	26,923,400
„ 1875	„	„	27,870,700

In the first of these years, as it would appear, the balance between supply and demand had been interfered with by excessive production, and a reaction had set in. Still, there can exist no doubt that, but for lack of demand, the ratio of increase which had held good up to the period of 1870 could and would have been maintained. But the demand fell off, and cattle could no longer be raised at profitable rates. At this stage it became the practice in the dairying districts to knock on the head large numbers of bull-calves as soon as they were calved, for the simple reason that, little as it was, they were worth more dead than alive; to which may be added the then great advantage of having them out of the way altogether. The calves were boiled down for glue, or as food for the pigs, for gelatine, or for any profitable purpose which might suggest itself—anything, in fact, to get rid of them. Now, however, "the slaughter of the innocents" will diminish greatly, if not cease altogether, and they will be reared for ultimate consumption on English dinner-tables! The result of this step, then, will of course be that, in three years' time, there will be an immense number of fat oxen available for exportation to England.

Calves reared in the dairying districts of the Eastern States—the surplus of them, that is—can, if expedient, be easily conveyed by rail to the cattle "ranches" of Central America, where their

TABLE II.—SHOWING the ESTIMATED NUMBER, AVERAGE PRICE, VALUE, and distribution of LIVE-STOCK in the UNITED STATES, in January, 1876, taken from the OFFICIAL STATISTICIAN'S REPORT to the U.S. DEPARTMENT of AGRICULTURE, 1875.

	Milch Cows.			Oxen and other Cattle.			Sheep.			Hogs.		
	Number.	Average Price	Value •	Number.	Average Price.	Value.	Number.	Average Price	Value.	Number.	Average Price	Value.
		Dolls c	Dollars.		Dolls. c	Dollars		Dolls. c.	Dollars		Dolls. c.	Dollars.
Maine	164,300	37 00	6,079,100	201,900	35 44	7,155,336	525,900	3 78	1,987,902	58,800	11 66	685,608
New Hampshire	98,200	38 50	3,780,700	118,000	38 12	4,498,160	242,400	2 70	654,480	37,300	16 20	604,260
Vermont	209,500	33 70	7,060,150	130,500	29 33	3,827,565	490,500	3 74	1,834,470	51,800	12 19	631,442
Massachusetts	140,300	48 33	6,780,099	120,000	47 59	5,710,800	76,300	3 63	276,969	75,600	18 03	1,363,068
Rhode Island	20,400	39 00	795,600	16,000	49 72	795,520	25,300	3 96	100,188	16,300	17 05	277,915
Connecticut	110,900	43 33	4,805,297	114,100	36 68	4,185,188	92,500	4 18	386,650	57,900	16 73	968,667
New York	1,496,300	37 50	56,111,250	663,200	31 85	21,122,920	1,936,500	3 95	7,649,175	568,700	11 39	6,477,493
New Jersey	144,900	44 37	6,429,213	83,000	36 60	3,037,800	125,800	5 01	630,258	153,000	13 83	2,115,990
Pennsylvania	837,000	34 68	29,027,160	708,100	29 03	20,556,143	1,640,500	3 58	5,872,990	875,000	11 50	10,062,500
Delaware	23,000	32 00	736,000	31,700	24 72	783,624	23,600	3 67	86,612	46,700	10 61	495,487
Maryland	100,700	30 31	3,052,217	119,300	22 87	2,728,391	141,200	3 89	549,268	233,500	7 10	1,657,850
Virginia	227,000	22 77	5,168,790	397,500	16 86	6,701,850	356,400	2 93	1,044,252	589,800	4 45	2,624,610
North Carolina	201,000	15 48	3,111,480	313,200	10 19	3,191,508	283,900	1 58	448,562	758,300	4 01	3,040,783
South Carolina	159,300	19 75	3,146,175	186,700	11 69	2,182,523	142,700	1 81	258,287	275,900	4 11	1,133,949
Georgia	265,100	17 02	4,512,002	400,900	8 91	3,572,019	371,200	1 73	642,176	1,360,700	3 91	5,320,337
Florida	66,800	14 62	976,616	363,400	8 14	2,958,076	37,800	1 94	73,332	175,400	2 26	396,404
Alabama	168,200	20 27	3,409,414	327,300	12 79	4,186,167	185,900	1 93	358,787	755,900	3 99	3,016,041
Mississippi	174,600	21 03	3,671,838	307,100	11 85	3,639,135	151,800	1 81	274,758	792,900	4 31	3,417,399

Louisiana..	89,600	20 71	1,855,616	171,900	11 68	2,007,792	68,800	2 04	140,352	222,600	3 98	885,948
Texas	500,100	15 72	7,861,572	2,343,700	9 57	22,429,209	1,691,400	2 00	3,382,800	1,090,000	4 09	4,458,100
Arkansas..	160,900	16 20	2,606,580	261,300	10 62	2,775,006	192,400	2 01	386,724	901,200	3 31	3,523,692
Tennessee	225,700	20 83	4,701,331	323,700	12 19	3,945,903	341,700	2 11	720,987	1,026,400	5 22	5,357,808
West Virginia	125,500	25 77	3,234,135	235,200	21 63	5,087,376	514,500	2 55	1,388,475	248,400	5 38	1,336,392
Kentucky..	244,700	27 94	6,836,918	389,600	21 14	8,236,144	683,600	2 85	1,948,260	1,604,300	5 51	8,839,693
Ohio	809,600	32 65	26,433,440	864,900	24 87	21,510,063	4,546,600	2 72	12,366,752	1,596,100	8 06	12,864,566
Michigan	361,100	33 70	12,169,070	410,000	26 35	10,803,500	3,450,600	2 65	9,144,090	459,700	7 93	3,645,421
Indiana	434,900	27 40	11,916,260	772,300	19 65	15,175,695	1,250,000	2 62	3,275,000	2,136,000	7 70	16,447,200
Illinois	717,800	29 05	20,852,090	1,287,000	21 54	27,721,980	1,311,000	2 41	3,159,510	2,640,100	8 63	22,784,063
Wisconsin	474,000	26 75	12,679,500	448,900	20 39	9,153,071	1,162,800	2 74	3,186,072	540,700	7 58	4,098,506
Minnesota	233,500	25 19	5,881,865	329,500	20 05	6,606,475	190,200	2 63	500,226	213,400	6 99	1,491,666
Iowa	621,800	26 90	16,726,420	913,200	20 91	19,095,012	1,663,900	2 66	4,425,974	3,296,200	8 08	26,633,296
Missouri	438,200	20 86	9,140,852	813,800	17 38	14,143,844	1,284,200	1 86	2,388,612	1,874,300	5 94	11,133,342
Kansas	235,700	23 76	5,600,232	486,200	18 95	9,213,490	123,900	2 80	346,920	246,500	8 91	2,196,315
Nebraska..	59,700	28 09	1,676,973	86,900	20 76	1,804,044	48,900	2 77	135,453	80,900	7 58	613,222
California..	363,800	31 46	11,445,148	1,075,000	20 08	21,586,000	6,750,000	2 02	13,635,000	363,300	7 17	2,604,861
Oregon	80,900	21 75	1,759,575	137,600	12 75	1,754,400	710,500	1 99	1,413,895	181,500	4 41	800,415
Nevada	9,900	33 00	326,700	46,700	21 00	980,700	20,900	2 60	54,340	5,200	9 00	46,800
The Territories	290,500	27 50	7,988,750	786,000	18 78	14,761,080	3,049,200	2 80	8,537,700	116,500	8 75	1,019,375
Total	11,085,400	..	320,346,728	16,785,380	..	319,623,509	35,935,300	..	93,666,318	25,726,800	..	175,070,484
Grand Average of Prices	..	28 89	..	..	19 04	..	..	2 60	..	..	6 80	..

growth up to a state of well-fed beef, may be well and cheaply carried on and completed.

The new commerce in dead-meat suggests in this place another consideration. As in England, so in America, the production of beef and mutton, as compared with dairying, admits of diminished labour-bills, and of smaller general expenses of the farm. This consideration will no doubt influence many of the dairy-farmers in the Eastern States to turn their attention, at all events in part, to the fattening of cattle for the butcher rather than to the production of cheese and butter in such large quantities as has now for some years been the practice in some of the Eastern States; and it may therefore follow, that we shall for a time receive less dairy produce from them than we have done in late years. Such being the case, the production of milk for cheese and butter making, and for the supply of our cities, will in England regain some of the ground it has lost. And it is not improbable that these two branches of agricultural enterprise—the production of beef and mutton on the one hand, and of milk on the other—will alternate in the two countries, as to the estimation in which they are held by farmers; that is, when cheese-making is in favour in America it will be in disfavour in England, and *vice-versâ.* This, however, is necessarily conjectural, and need not be pursued any farther now. But, be that as it may, the new outlet for their fat-stock will cause American farmers to turn their attention more to the production of beef and mutton than they have hitherto had inducement to do.

It may be thought now that, at all events until three years hence, America will not be able to send us very much flesh-meat; but the following considerations seem to me to demonstrate the fact, that America is already in a position to spare immense quantities of animal food. They are given on the authority of "W. G.," in 'The Country' newspaper, in March last:—

> "By roughly estimating the statistics which we gave last week, we find there are in America about nine acres of land 'in farms' to every head of the population, and about three head of cattle to every four people estimated in the last census. In Canada there are four and a half acres of the best grazing land of the Dominion to every head of the population, and about two head of cattle to every three persons. But in Great Britain and Ireland there are about three-quarters of a cultivated acre to every person, and only one head of cattle to every three of the inhabitants. These facts show that, while our own proportionate produce of beef is comparatively restricted, the supply in both Canada and the United States will be practically unlimited for many years to come."

That these conclusions, for all necessary purposes of comparison in this connection, are substantially correct, will be seen by the following comparisons, which are from Returns made in 1870 in the different countries:—

	Population	Acres in Farms.	Cattle.
United States	42,856,000	405,226,799	28,674,582
Canada	3,727,000	14,550,560	2,484,646
Great Britain and Ireland ..	31,205,000	46,177,367*	9,235,052

In the great dairying States of the Union (namely, New York, Pennsylvania, Ohio, Illinois, more particularly) calves are reared much in the same way as in England. Where milk is valuable for cheese and butter making, it is naturally economised for that purpose; but in districts where cheese-factories have not yet been established, the calves are reared by allowing them to suck from the cows. Mr. N. P. Wisborg, of Kansas, from whose letter I have previously quoted, thus describes the custom of rearing calves which is in vogue in his section of that State:—"Calves are raised by allowing them to suck from the cows; they are turned to their mothers twice a day, and get half the milk, and are kept in a separate pasture between times. After four months the calves are taken off and kept apart from the cows until the habit of sucking is forgotten, when they are turned out with the rest of the herd. At three years old we begin to feed with grain, and shove along over winter."

In some other quarters calves are allowed to run constantly with their dams until old enough to be finally weaned from milk, and an excellent foundation is thus laid for fine well-developed animals. In the more northern States, such as Ohio, Indiana, Illinois, &c., where the winters are severe, these young cattle are more or less protected from the inclemency of the weather by one kind or another of natural and artificial shelter, and they require to be supplied with food over and above what they may be able to procure for themselves. Deep snows, which commonly lie for several weeks, and even for months, prevail in the northern winters, and during these times the cattle depend entirely on food supplied to them by man; but when there is little or no snow on the ground they can help themselves to a greater or less extent from the land. But in many parts of the vast territory which is embraced in the States of Kansas, Nebraska, Missouri, New Mexico, Colorado, Texas, Missouri, Arkansas, Arizona, Mississippi, Louisiana, &c., &c., the cattle can do well out on grass all the year round, and they require but little attention and no feeding, for in these latitudes the winters are more genial. It is from these States, and others possessing similar advantages, that the great supplies of American beef must be drawn for future exportation to England. For some years they have sent considerable numbers of cattle annually to the Eastern States.

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* This figure, like those above it, includes grass-land, but the area under crops amounted only to 24,092,072 acres.—EDITOR.

A special correspondent of the 'Chicago Tribune' wrote from Colorado in December last, as follows: "It is only five or six years since the cattle men began to put their 'drives' in any considerable numbers well out on to the pastures to graze; and before that time very few permanent ranches were established. Now there are hundreds of herds, each numbering from 1000 to 5000 cattle, and some running as high as 10,000 and 20,000, along the Smoky Hill, the Arkansas Valley, and the Laramie Plains. The Platte and Arkansas, far up to their very sources, the divide separating their head-waters, the foot-hills, and the parks in the very heart of the Rocky Mountains, have been found good pasturage. This business has increased rapidly." The same correspondent refers specially to some of the Colorado herds, giving their numbers and the names of their owners:—

> "J. W. Iliff, on the South Platte, has from 20,000 to 25,000 head; he added 10,000 to it last year. John Hitson, on the Bijou, used to have 20,000, but he reduced his herd to from 3000 to 4000; Wilson Brothers, on the Big and Little Muddy, 3500; J. P. Farmer, Bijou, 3000; Lyman Cole, Big Muddy, 2000; Williams and Wetzell, Beaver, 3000; Charles Goodnight, Arkansas Valley, 5000; J. L. Brush, South Platte, 2500; Johnsons and Donaldson, Evans, 4000; Crow and Randall, Arkansas Valley, 2000; William Beckwith, Wet Mountain Valley, 5000; Dickey and Brother, San Luis Valley, 5000; William and Edward Clayton, San Luis Valley, 2000. This makes about 60,000 head owned by thirteen different cattle firms. There are a great many herds on the South Platte, Bijou, Box Elder, Arkansas, Purgatoire, St. Charles, Huerfano, and in the Wet Mountains; Estes, North, South, and Middle Parks, running from 1000 to 2500 head each. There are probably 800 to 1000 smaller cattle-owners, having from 500 to 800, or 1000 head each."

The following is from the pen of the special correspondent of the 'Scotsman,' and dated Denver, Colorado, June 5, 1877:—

> "The 'Cattle King' of Colorado is Mr. J. W. Iliff, of South Platte. He began cattle-raising on a small scale in 1861, and now owns close on 35,000 cattle and nine ranches, extending to over 15,000 acres, and stretching for thirty miles along the north bank of the south fork of the river Platte. The State land grants, extending to about 650,000 acres, have not as yet been located, and therefore the prairies of Colorado are all (or have been) subject to the Homestead and Pre-emption laws, which make it impossible for a man to buy up large tracts of land. Mr. Iliff obtained his large estate by buying out settlers, many of whom were his own cattlemen, who homesteaded or pre-empted most probably with the view of selling off as soon as possible. Mr. Iliff keeps from 6000 to 7000 cows, and uses none but shorthorn bulls. He has been using improved sires all along, and now he has probably the finest stock in the State. He buys his bulls generally in Illinois and Iowa, believing that animals bred in these States stand the change to Colorado better than those bred in more eastern States, and pays for each from $60 to $80 (12*l.* to 16*l.*). His draft for this year, numbering fifty, arrived the other day, and these will

be grazed during the present summer on reserved pastures and fed on hay in sheds the first winter, so as to accustom them gradually to the rigour of the Colorado winters. About the month of July, Mr. Iliff buys in from 10,000 to 15,000 Texas steers, rising two and three years, and retains them for a year or two, and then exports them to Chicago as beef in the fall, along with three and four-year-old steers of his own breeding. When bought these Texans weigh from 600 to 800 lbs., and cost from $11 to $15, and when sold they weigh, on the average, about 1000 lbs., and bring from $30 to $37, or from 3¼ to 3¾ cents per lb. of live weight. Mr. Iliff's steers of his own breeding weigh from 1100 to 1200 lbs. when sold, and bring from $38 to $50, or from 3½ to 4¼ cents per lb. These native steers would probably weigh from 600 to 700 lbs. in beef, which would thus cost the man who slaughters the animals from 6½ to 7½ cents, or from 3¼*d.* to 3¾*d.* per lb. Mr. Iliff employs about forty men all summer, and a dozen during winter, and pays them from $25 to $30 a-month and board. He requires 200 horses, and these are all bought in. Occasionally, in a severe snowstorm, cattle get a little hay, but never taste corn.

"A good many herds, belonging to Wyoming and Nebraska stock-owners, mingle with Mr. Iliff's cattle between the north and south forks of the Platte River. Messrs. Swan Brothers have about 12,000; Messrs. Cary Brothers, 10,000; Messrs. Creighton and M'Shane, 10,000; Messrs. Sturgers and Lane, 8000; and Mr. Searight, 6000; while several others have herds nearly as large. All these men work, in the main, on the same plan as Mr. Iliff, but all are not so careful in the procuring of really good sires."

It is not likely that many cattle from these herds have at present found their way to England; but they have served to fill up the gap caused by the dressed-beef trade in the States from which such beef has hitherto been drawn; and in course of time we shall probably procure meat from all the Western States. It is said that more cattle would have been sent to the seaboard from Illinois and Kentucky, but that the new business quite overtaxed the rolling-stock of the railway companies. The meat sent to England is from the "improved" herds, none but the best qualities being thought good enough for the export trade. The exporters were wise enough not to run the risk of injuring the reputation of the new business by sending any but first-class qualities, and the result was that American beef soon conquered the prejudice which at first existed against it in the minds of the British public.

The native-bred cattle of Texas are considered inferior to those of most other Western States. Centuries ago the Moors of Andalusia reared large herds of awkward, lanky, long-horned cattle, some of which were taken across the Atlantic by the Spaniards who discovered Mexico, and afterwards settled in Texas. These cattle have been so exclusively reared ever since, that the Texan cattle of to-day may be called full-blooded Spanish, and they are said to have inherited all the characteristics of the original stock. On the vast plains of Texas these cattle became, to all intents and purposes, wild cattle; and even yet some of the herds are in a semi-wild state, so that it is unsafe for a man on foot to venture amongst them. These Texan cattle are sent in very considerable numbers to the great corn-raising districts of the Mississippi Valley, where they are fattened. Few, however, if any, of the pure wild-bred stock are sent, the native being of very inferior quality, difficult to fatten, and not valuable when fat. Great efforts are now being made to improve these cattle, and so far with marked success, for they are said to improve marvellously when crossed with the Shorthorn.

The special agricultural reporter of the 'Scotsman,' under date May 2nd, wrote from San Antonia, Texas, as follows:—

> "There are a few 'broad-acred squires' here. Captain King, Nueces County, possessess 150,000 acres fenced, and about 200,000 unfenced land, and owns between 40,000 and 50,000 cattle and 5000 sheep. His herd of cattle was at one time much larger, but he has reduced the number so as to enable him to proceed quickly with the improvement of his stock, and also to *rest* his pastures within fence. Captain Kennedy, also of Nueces County, owns about 140,000 acres, all within fence, and about 40,000 cattle; while Messrs. Coleman, Mathis, and Fulton, of Aransas, have 210,000 acres within fence, and own about 100,000 cattle. This firm, in fact, are the largest stock-owners in Texas, and may well be so. Mrs. Rabb, Corpus Christi, has 50,000 acres enclosed, and owns 15,000 cattle, about one-half of her herd having been disposed of in one contract last fall at $4, or 16*s.* a head. There are many others who count their acres and cattle by thousands."

The price Mrs. Rabb is said to have sold half her herd at, if true, denotes that the cattle were of the commonest kind; for I read in an extract from the 'New York Times,' that Mr. King sold a large number from his herd, to go to Kansas, at $33.00 per head, or about 6*l.* 10*s.* The same correspondent says,—

> "These animals get no food summer or winter but what they gather on the prairies and in the woods; and scarcely any watch is kept over them except in spring and fall, when the increase for the year is branded. All the herds within a radius of hundreds of miles mingle together on the unfenced ranges, and therefore it becomes imperative on every individual owner to have a distinct brand for himself. These brands have to be registered with the State officials, and are advertised in certain newspapers, and generally consist of one, two, or more letters, often joined in strange fantastical forms. One man may have several brands, and sometimes instead of selling so many hundreds or thousands, he sells a certain brand, the 'strength' of each brand being reckoned from the number of calves branded last season. It is decreed by the State that every unbranded calf over twelve months old that is found wandering without its mother shall become the property of him who may first put his brand upon it, and to avoid losses in this way as far as possible, stock-owners go through the branding process twice every year—in spring and fall.
>
> "As a rule, grass is plentiful in summer, and by the end of autumn cattle are invariably in very fair condition; but the waste of winter wears most of the fat away. It is 'a feast and a famine' with the Texas cattle, and in a severe winter, such as the last, many thousands die from exposure and want of food. The average loss by death in the winter is about 20 per cent., and last winter—the most severe season experienced in Texas for many years—the loss in some cases was more than 30 per cent. The prairies here and there are strewn with whitened skeletons, and only an acclimatised Texan

could contemplate with equanimity the fate of these unfortunate famished animals.

"The grass is neither rank nor very strong, but close, green and thriving; whilst the same healthy promising appearance is displayed by the few patches of Indian corn, cotton, and oats—scarcely any wheat being grown in the south and south-western portions of the State, to which this letter particularly refers. 'This, however,' says a Scotchman who has been resident here for several years, 'is the best time for a stranger to see Texas. Now everything is green and healthy-looking, but if you were here in the end of June and July you would see everything scorched and withered-up with heat.'"

Mr. L. F. Allen, Editor of the 'American Shorthorn Herd-Book,' in a letter to me dated Buffalo, New York, April 16th, speaks as follows of the Texan cattle:—"None but first-class cattle are fit for exportation. Texan cattle, so called, are comparatively worthless, although thousands of them are slaughtered for packing, and any numbers of common ones of our native breed, uncrossed by *improved* bulls, fill our markets for home consumption, and at much lower prices than are taken for exportation."

John T. Jones, Esq., of Barton, Arkansas, Master of the National Grange, in a letter dated May 12th, wrote to me:—"The meat resources of our country are incalculable—equal to the demands of any market. Better perfection in breeds I cannot conceive of than they now have in the older States, though there is great need of improvement in many of the new States, especially in the immense State of Texas—the largest cattle-producing State, perhaps, in the world."

"The live and dead meat trade," says the 'Toronto Globe' of May 18th, "has caused a marked increase of enquiry for shorthorn bulls and bull-calves of good constitution and pedigree. The series of shorthorn sales at Dexter Park, Chicago, closed on May 12th, after a four days' campaign of more than fair success. The great object now is to produce, from native stock, an animal that will mature a year earlier, weigh more when mature, and bring a higher price than the native cattle; and in order to do this it is necessary to cross the latter with pure-bred animals which have had the traits of early maturity, massiveness, and juiciness implanted in them by several generations of breeding to these ends. For this shorthorns are prefered to any other breed, and already car-loads of young shorthorn bulls are being shipped to Texas and the West. The movement towards improving farm-stock is now fairly under way, and in after years these energetic measures will bear fruit. Some difficulty has been found in acclimatising pure-bred shorthorn bulls to the Texan climate, but with care bull-calves are found to do well."

The special reporter of the 'Scotsman,' in the following, gives a good description of Kansas enterprise and capabilities. His descriptions may be accepted as fair and trustworthy:—

"During the past three or four years, shorthorn bulls have been imported pretty largely, and it seems very probable that before the lapse of an equal period of time few others will be in use. The majority of these bulls have hitherto come from Illinois, Ohio, Indiana, and Kentucky; but by-and-by

Kansas seems likely to become almost self-supporting in this respect. Mr. Albert Crane's shorthorn herd at Durham Park, Marion County, Kansas, is one of the largest and also one of the best in America, and several others throughout the State have commenced on a smaller scale to rear the fashionable shorthorn.

"Durham Park lies in the eastern division of the State, just south of the central line, and all around for many miles is beautiful open rolling prairie. It extends to 10,000 acres, was purchased four years ago by Mr. Albert Crane, of Chicago—a wealthy gentleman of English descent, who has for long been engaged in real estate speculation. It was then all open prairie, but Mr. Crane has enclosed and subdivided the whole, erecting in all 43 miles of 'post and plank' fence, at a cost of £100 per mile. About 3000 acres have been brought under cultivation, and more than average crops of Indian corn, rye, and oats are grown. The soil is fertile sandy loam, and is very easily cultivated. The shorthorn herd numbers in all about 200 head, and contains a Bates and a Booth department. It has been collected with great care and almost regardless of outlay, is in good condition, and is really a very valuable herd. Refreshing sight indeed to glance at those stylish massive roans after a six weeks' ramble among long-horned, rough, ragged-looking Texans and grades! All things are judged by comparison. The popular 'red, white, and roan' never before seemed so grand an animal. No razor-backs here. A characteristic American, who happened to inspect the herd along with the writer, and who claimed some acquaintance with Texas cows, handled one of the stock bulls carefully, and, stretching his arm across the broad, well-covered loins of the massive animal, he remarked, with the air of a critic, 'Guess he ain't got a very well shed roof, that un!'

"The Bates department numbers over seventy, and at the head of it are 'Grand Prince of Clara' (28781), 'Royal Lancaster' (29870), and 'Lord Bates II.' (23740)—bulls of good character and fair quality. The second and third Duchesses of Airdrie are at Messrs. Avery & Murphy's, Port Huron, paying a visit to the twenty-third Duke of Airdrie; but their two yearling heifers (Duchesses of Airdrie, sixth and seventh), after second Duke of Hillhurst, are here, and are looking well. Mr. Crane recently refused an offer of 100,000 dollars (20,000*l.*) for these four females. The fine, lengthy, stylish light roan Hecuba bull 'Lord of the Lake' (20250) is at the head of the Booth department, and is assisted by 'Star of the Border' (24923) of the famous Braithwaite Vesper family; by 'Knight of the Crescent,' a straight Torr; and by 'Star of Empire,' a pure Booth, and half-brother to 'Star of the Border.' Several of the females in this department are of very high merit, but extended notice here is impossible. Mr. Crane, of course, from such high-pedigreed animals as about a third of the herd rears bulls that are too valuable to use in the improving of the general stock of the country; but still from a number of his pure cows, and from a herd of grades, he raises more than a hundred bulls, which he sells at from 60 to 100 dollars (12*l.* to 20*l.*) to farmers throughout the Western States. He finds that the demand for bulls of this kind is larger than he can supply. A few of these graded bulls are plain, but on the average they show fair shapes and good quality. A Colorado stock-owner took away a useful lot of 30 the other day, at from 60 to 70 dollars a head. Shedding is abundant, and all the shorthorns were stalled at the time of my visit.

"In addition to the shorthorns and graded cows, Mr. Crane has about 4000 improved Texan cows and steers, which run through the parks, and which will be fed off on grass and hay, and probably also a little corn. Last winter 100 cows were fed and sent to Kansas city, where they sold at close on 6 cents (3*d.*) per pound. With good feeding the steers now grazing at Durham Park should make good beef. Mr. Crane also owns a lot of very fine Berkshire and Poland-

China hogs, and realises large prices both for breeding and butcher animals. A talented Scotchman, Mr. William Watson, late of Kellior, Forfarshire, is manager at Durham Park, and that fact alone is sufficient testimony of how affairs are conducted."

I have hitherto said little or nothing about American sheep; nor, indeed, is it necessary to refer to them specially, because the same conditions apply to them as to cattle. I may, however, remark that mutton in the States is not held in as high estimation, as an article of food, as beef is. In many sections of the country sheep are kept for the wool-crop only, the mutton being unsaleable. Hitherto a comparatively small quantity of mutton has been exported to England. The Americans will now, however, turn their attention to improving their sheep, with a view to their value as mutton as well as wool, and we may expect after a time to receive large quantities of trans-Atlantic mutton as well as beef. Cotswolds and Border Leicesters are said to do remarkably well in America.

In January of last year there were 27,870,700 cattle in the United States, and as they had been increasing since 1873, it is safe now to assume that there are at the present time, in round numbers, twenty-eight millions. Of these there will be at least six millions annually available for slaughter. If we allow these to weigh 700 lbs. each, net—which is certainly not too high an average for American fat cattle—we have a total of 4,200,000,000 lbs. of beef per annum available for human food; or 95 lbs. per head of a population which is now estimated to be forty-four millions.

Of sheep there are now, in round numbers, thirty-six millions. Of this number there will be, say one-third, or twelve millions annually available for slaughter; and if we allow these to average 70 lbs. each, net, we have a total of 840,000,000 lbs. of mutton, or 19 lbs. per head of the population.

Of pigs there are twenty-six millions, more or less. Of this number there will be, say twenty millions annually available for slaughter; and if we allow each pig to weigh 140 lbs. net, we have a total of 3,640,000,000 lbs., or 82 lbs. per head of the population. The figures stand thus:—

	Annually available for Slaughter.	Net Weight of Flesh in lbs.	Average in lbs. per Head of Population.
Cattle	6,000,000	4,200,000,000	95
Sheep	12,000,000	840,000,000	19
Pigs	20,000,000	3,640,000,000	82
	38,000,000	8,680,000,000	196

It is estimated that we consume annually 100 lbs. of meat per head of our population; and if our population may be estimated at thirty-six millions, we thus eat 3,600,000,000 lbs. of flesh in one year. Now, if the Americans eat no more per head of population than we do—and we may take this for granted—it follows that

	lbs. of flesh-food per annum.
The Americans produce	8,680,000,000
„ „ eat	4,400,000,000
„ „ can spare	4,280,000,000

The surplus of animal food available for exportation from the United States is thus greater than the whole quantity which is eaten in the British Islands. Consequently we have no need to be anxious about our supplies from the Continent of Europe, even if Continental live cattle are eventually prohibited on account of the diseases they bring us. Diseases finally excluded from the country, our own flocks and herds would rapidly increase, and these, coupled with the American supply, would, if necessary, make us thoroughly independent of Continental meat, while the public would be supplied at lower prices than they now have to pay. And, beyond the quantities mentioned above, we must remember that Canada is already a large meat-producing State, and that she bids fair to rival, in the course of time, the United States themselves in this department. She is already sending us large numbers of live cattle of excellent quality, besides a considerable quantity of dead meat; and her exports will increase in more rapid proportion than those of the United States.

PRICES OF CATTLE IN AMERICA.

Hitherto the States of Illinois, Indiana and Kentucky have been the chief sources whence the dead meat sent to England has been drawn. The Chicago cattle-market, being the chief emporium of the Middle States, has set the prices for that section of the country, and it is there that the exporters purchase the bulk of their supplies. Chicago, situated as it is on the shores of Lake Michigan, and on the Pacific Railroad, is the natural outlet of the Middle and Western States—this is the explanation of its marvellous growth. Its trade is already stupendously large, not in cattle only, or in sheep and pigs, but to a prodigious extent in "corn" and grain, and in all agricultural productions. Every year this trade increases, and every year it must continue to increase for a long time to come. The development of the vast, the unlimited wealth of the West has really only just fairly started. Mr. Coleman, of Riccall Hall, York, who visited the Centennial Exhibition at Philadelphia as British Juror, thus speaks of the Chicago cattle-market:—

> "The Union Stock-yard, *i.e.*, the market for live cattle of all kinds, is admirably managed, and, as far as regards the comfort of the animals and the facilities for the despatch of business, is quite a model. The different lines of railway bring the stock right into the market. There is no barbarous driving through the streets; each animal or truck of animals, as unloaded, is placed upon a weigh-bridge, and the figures are made use of for sale. The animals are driven into comfortable lairs, where they are supplied with hay and water, and where they can be inspected by the purchaser. I believe graziers can attend the market and sell their own cattle, paying certain fees to the Union Company; but, as a rule, the business is delegated to salesmen, who occupy offices on the premises. The railways are under Government inspection, and are compelled to untruck and feed the animals after certain distances have been travelled. America boasts a Humane Society, whose officers, located on the spot, are on the look-out for miscreants. One of the most interesting exhibits at Philadelphia was a large collection of instruments of torture taken from drovers. Buyers in the Chicago market are either exporters or slaughter-men; the latter take the offal and dispose of the carcass to the retailers. At the time of my visit, in June, beef was selling at from $4·60 to $4·75 per 100 lb. live weight, equal to 4*d.* per lb. dead weight. Butchers were charging from 12 to 15 and even 18 cents per lb. for the best joints, so there are big profits made between the wholesaler and retailer. The weekly and monthly sales are recorded on a black board in the hall of the Company. The weekly sales for week ending June 18 were cattle, 24,200; sheep, 4,414; hogs, 76,358. The total for May was cattle, 115,140; sheep, 171,745; hogs, 307,250. During the winter months the trade in pigs is quadrupled. A comparison of the figures for 1857 and 1875 will give an idea of the increase in production:—

	Cattle received	Cattle shipped.
1857	48,524 .. .	25,502
1875	920,843	696,534

	Hogs received.	Hogs shipped.
1857	244,345	123,568
1875	4,085,122	1,736,166

The receipts of cattle in the Chicago market increase so rapidly, that the Stock-yards Company has found it difficult at times to supply facilities for their immense consignments, notwithstanding the additions, alterations, and improvements, that were made last year in the yards at a cost of some 60,000*l.* The receipts of cattle for 1876 compare with the previous year as follows:—

	Cattle received.	Cattle shipped.
1875	920,843	696,534
1876	1,098,206	753,698

Lean and fat stock alike are sold, and the market-prices for all ades of cattle are quoted at so much per estimated or ascerined 100 lbs. of the live weight of the animal, and the dressed-meat weight is estimated at 52 to 60 per cent. of the live weight, the per-centage varying between these points according to the quality, breed, and condition of the animal. For the ordinary run of well-fattened, grade, shorthorn cattle, the per-centage of dressed meat per 100 lbs. live weight is taken for granted to be 57, there or thereabout, and it is seldom, if ever, that a beast has quality enough to go beyond, or even up to, 60 per cent. The following quotations of prices I clip from the 'Prairie Farmer,' a highly respectable agricultural paper published at Chicago. The quotations are for cattle sold in the Union stock-yards:—

For the week ending September 2nd, 1876:—

	Dollars per 100 lbs.
Choice graded steers	5·00 to 5·25
Good to choice native steers	4·60 „ 4·85
Fair to medium steers	4·00 „ 4·40
Choice corn-fattened Texans	3·75 „ 4·00
Through Texans	2·75 „ 3·65
Stock steers	2·75 „ 3·75
Cows and heifers	2·75 „ 3·75

For the month of November in the same year the receipts of cattle at the Union stock-yards, as officially reported by the Secretary, George T. Williams, were:—

Cattle	90,646
Sheep	33,673
Hogs	569,195

These figures, compared with the receipts for the same period in the previous year, show an increase of 18,643 cattle; 77,802 hogs; and a decrease of 6994 sheep; whilst prices were as follows:—

	Dollars per 100 lbs.
Choice graded steers	5·00 to 5·25
Good to choice native steers	4·60 „ 4·90
Fair to medium steers	4·25 „ 4·50
Common to fair steers	3·75 „ 4·00
Through Texans	2·50 „ 3·60
Stock steers	2·75 „ 3·50
Cows and heifers	2·59 „ 3·50

The receipts and shipments of live stock in the present year, for the week ending March 3rd, were:—

	Received.	Shipped.
Cattle	28,881	17,998
Hogs	55,101	15,703
Sheep	8,246	4,374

and the prices:—

	Dollars per 100 lbs.
Extra heavy graded steers	5·75 to 6·00
Choice graded steers	5·25 „ 5·50
Good to choice native steers	4·60 5·00
Fair to medium steers ..	4·15 4·45
Common to fair steers ..	3·75 4·00
Through Texans	2·75 3·75
Stock steers	3·00 3·75
Cows and heifers	2·75 3·75

For the week ending May 2nd the receipts and shipments were:—

	Received	Shipped.
Cattle	25,251	17,467
Hogs	91,065	22,039
Sheep	5,734	4,083

and the prices:—

	Dollars per 100 lbs.
Extra heavy graded steers	5·50 to 5·75
Choice graded steers	5·25 „ 5·50
Good to choice native steers	4·70 „ 5·20
Fair to medium steers	4·40 „ 4·60
Butchers' steers	3·90 „ 4·25
Stock steers	3·50 „ 4·50
Cows and heifers	3·25 4·25
Bulls	2·75 4·00
Veal calves	3·50 5·50
Milch cows per head	25·00 40·00

Beneath are quotations of the New York, Boston, and Buffalo markets for the second week of May:—

NEW YORK, May 12.

Beeves.—The Journal of Commerce reports:—

Per 100 *lbs., dressed beef.*

	THIS WEEK. Dollars.		LAST WEEK. Dollars.
Extra beeves	11·50 to 11·75	..	11·75 to 12·25
Prime	10·75 „ 11·25	..	11·25 „ 11·50
Good	10·25 „ 10·50	..	10·75 „ 11·00
Medium to fair	9·50 „ 10·00	..	9·75 „ 10·50
Poor to medium	9·00 „ 9·50	..	9·25 „ 9·75
Bulk	10·00 „ 10·50	..	10·25 „ 10·75
Average ..	10·25 „ ..	..	10·50 „ ..
Choicest ..	12·00 „ 12·25	..	12·00 „ 12·25
Worst	9·00 „ 9·25	..	9·25 „ 9·50
Texans ..	9·25 „ 10·25	..	9·25 „ 10·50

Receipts, 12,770; last week, 10,142; last year, 9133. The tone of the market was duller but steady.

Milch Cows.—Receipts, 56. Market quiet at $50 to 70, calf included.

Calves.—Receipts, 5710. Demand very good, and trade fair at 5 to 6 c. per lb. for common to prime veals.

Sheep and Lambs.—Receipts for the week, 17,015. Supply average, and the market closed active at quotations. Common to prime sheep ranged from 5 to 7¾ c. per lb. Dressed mutton was in moderate request at 7 to 11 c. per lb. for common to prime carcasses.

Swine.—Receipts, 31,120. Live hogs steady at 5¾ to 6⅛ c. Dressed hogs dull at 7¼ to 7⅝ c. for heavy to light.

BOSTON MARKETS, May 12.

Beeves, Northern.—The Advertiser reports:—

Per cwt., hide, tallow, and beef.

	THIS WEEK. Dollars.		LAST WEEK. Dollars.
A few premium	.. to 8·75	..	.. to 8·75
Good oxen ..	8·00 „ 8·50	..	8·00 „ 8·50
Fair to good	7·00 „ 7·75	..	7·00 „ 7·75
Second quality	6·00 „ 6·75	..	6·00 „ 6·50
Third quality	5·00 „ 5·75	..	4·75 „ 5·75

WESTERN, ALIVE, *cents per lb.*

	THIS WEEK.		LAST WEEK
A few premium	6¼ to 6⅜	..	6⅛ to 6¼
Extra, so called	5⅞ „ 6⅛	..	5¾ „ 6
Good to prime	5⅜ „ 5¾	..	5¼ „ 5⅝
Light to fair	4½ „ 5¼	..	4⅜ „ 5⅛
Slim	4⅛ „ 4⅜	..	4 „ 4¼

Milch Cows.—There was a fair trade in cows at $30 to 75, calves included.

Sheep.—Prices are weak at 5 to 8 c. per lb., or $3 to 7·75 per head. Spring lambs, 11 to 12 c.

Swine.—Fat hogs, alive, sell at 7 c. per lb. Store pigs, wholesale 7½ c.

BUFFALO, May 12.

Beeves.—Closing quotations compare as follow:

Per cental, gross.

	THIS WEEK. Dollars		LAST WEEK Dollars
Extra	5·75 to 6·00	..	5·65 to 5·87½
First quality	5·37½ „ 5·60	..	5·25 „ 5·40
Second quality	5·00 „ 5·20	..	4·75 „ 5·12½
Poor to medium	4·10 „ 4·75	..	4·00 „ 4·50
Stock steers	3·75 „ 4·50	..	3·50 „ 4·25

Receipts, 10,937 head, against 13,293 last week. The demand was only moderate, but the lighter supply and favourable eastern markets kept prices up to quotations to the close.

The price in Chicago was 4*d.* to 5*d.* per lb. for the choicest beef; in New York at the same time it was 5*d.* to 6*d.* per lb. These are the wholesale prices for dressed beef. At the same period the wholesale price in the London (Metropolitan) market was 7½*d.* to 8½*d.* per lb. for best beef. The "choicest" American beef may be taken as equal to the "best" English in the respective markets. Thus, allowing ½*d.* per lb. as the cost of ocean transit, there is still a disparity in the price of beef of 2*d.* per lb. between the two cities in which meat is probably dearer than in any other two in the world—New York and London; and this disparity leaves ample margin to the New York shippers for a substantial profit.

The prices current at the various great markets in the States seem to bear a pretty constant relation to each other; the differences being caused by the varying freights from west to east, according to the distance to be travelled, and from causes which are accidental and local—such as a sudden excess or diminution of receipts,—which are soon equalised again by shipments following. The following prices are for actual sales transacted at the places mentioned on February 14th, viz.:—

	Wholesale per 100 lb (live weight)		Retail, per lb.
	Choice Beeves, 1400 to 1550 lbs	Fair Beeves, 1100 to 1300 lbs	
	Dollars.	Dollars	Cents
Chicago	5·30 to 5 50	4·40 to 4·85	11 to 15
St. Louis	5·50 ,, 6·00	4·80 ,, 5·25	12 ,, 16
Montreal	None sold	4·87½ ,, 5·00	10 ,, 15
New York	*11·25 to 11·75	10·00 ,, 11·00	16 ,, 28
Boston	6·37½ ,, 6·75	6·00 ,, 6·25	12 ,, 28
Philadelphia	None sold	5·25 ,, 5·75	12 ,, 25

* Price for estimated dressed weight, 58 lbs. to 56 lbs. per 100 lbs.

From the best information I can obtain it appears tolerably clear that, whilst prices of flesh-meat have for some years been advancing in England, in America they have been declining. Mr. L. F. Allen, Editor of the 'American Shorthorn Herd-Book,' informs me, in a letter dated April 16th of the present year, that "beef is now about 15 per cent. less in price than two years ago." The depression in trade, no doubt, has largely contributed to this; but the great and rapid increase of cattle up to the year 1870, by which the supply had outgrown the demand, contributed still more to it. Notwithstanding these things, however, there has been all along, and still is, a greater disparity between the prices of fat cattle in bulk and the retail prices of meat, than any recognised canon of trade I am acquainted with can explain.

The retail prices given in the margin of the foregoing list show that the butchers—to use the language of an American correspondent—"seem to have a grip on their customers, and squeeze them unmercifully and unreasonably, especially in the eastern cities." They are, therefore, no criterion to the wholesale prices, and they cannot have much influence over the export trade, nor it over them; and they need not enter into any calculation which is made to illustrate the cost of producing beef in America. The gradual decline in retail prices may be traced in the following quotations, which were compiled from official sources and contributed to the 'Field' newspaper of March 24th:—

"I send you the following for the years 1867, 1869, and 1874, compiled from official data. The average prices for the New England and Middle States only are given, although the average for the other groups of States can also be supplied.

"The average prices in New England for the years mentioned were respectively as follows: Roasting pieces, 1867, 20 cents; 1869, 20 cents; 1874, 18 cents. Soup pieces, 1867, 9 cents; 1869, 9 cents; 1874, 8½ cents. Rump steak, 1867, 24 cents; 1869, 23 cents; 1874, 19½ cents.

"As the greatest number of artisans and labourers, including mill operatives, are in Massachusetts, I give separately the prices in that State for 1874. They were as follows: Roasting pieces, 22¼ cents; soup pieces, 10 cents; rump steak, 23½ cents.

"The average prices in the Middle States for the same period were: Roasting pieces, 1867, 18 cents; 1869, 17 cents; 1874, 14 cents. Soup pieces, 1867, 13 cents; 1869, 13 cents; 1874, 10 cents. Rump steak, 1867, 18 cents; 1869, 18 cents; 1874, 16 cents.

"The average prices in New York State, including the City of New York, were: Roasting pieces, 1867, 19 cents; 1869, 19 cents; 1874, 15¾ cents. Soup pieces, 1867, 10 cents; 1869, 9 cents; 1874, 8 cents. Rump steak, 1867, 21 cents; 1869, 20 cents; 1874, 15¾ cents.

"I have no exact data as to the present retail prices of fresh meat; but during the week ending March 3, at Washington market—the New York Smithfield—fair to good sides of dressed beef were sold wholesale to New York salesmen at 7½ cents to 8½ cents per pound. Prime sides brought 9½ cents to 10½ cents."

For the following valuable and most interesting letter I am indebted to Professor G. E. Morrow, of the Illinois Industrial University:—

"DEAR SIR, "Champaign, Illinois, May 10, 1877.

"In considering the question of the live and dead meat trade from America to England, the great point, as it seems to me, is that of cost of ocean transportation, and the condition of the meat on arrival. It is not mere boasting to say that in both quantity and quality the supply will keep pace with the demand. The extent of our country is so great, and so large a part of it so well adapted for the rearing of live-stock, that a practically unlimited increase of production can be had, if the product can find a remunerative market. It has been a subject of a good deal of thought for a few years past, what was best to be done in view of the full meeting of the present demand, and sometimes the over supply. Hence the opening of this new trade has been felt to be a matter of much consequence. It is but fair to say, however, that it has not awakened nearly the interest here that it has in your country.

"Illinois has more than 35,000,000 acres of land, and of this but a very small proportion is not capable of tillage or of being profitably grazed. Its great central belt is peculiarly a 'corn and grass country'—corn here meaning maize. Our University is situated in Champaign County, 128 miles south of Chicago, and is one of the prominent cattle-growing regions of the State, yet a ride across the county in any direction would satisfy anyone that the number of cattle might be quadrupled, and still not at all fully stock the farms. The same is true of sheep.

"Chicago is the greatest live-stock market of the country. St. Louis is also a prominent western market. The official statements show that in 1876, there were received at the Union stock-yards of Chicago, of cattle, 1,066,745, of which 797,724 were re-shipped, mainly to the east; of sheep, 364,095 were received, and 195,235 were shipped. The cattle were valued at $46,063,290; the sheep at $1,456,380. It should be borne in mind that considerable numbers of the cattle were 'stock' cattle, sold to be fed; hence the apparently low average.

"As to means for transportation, we have from Chicago some five trunk lines of railroads; from St. Louis two; and others from Cincinnati. This State, and most of the Western States, has several lines of railroads crossing it. In this State there are few points from which cattle would have to be driven more than 25 miles to reach a railroad station. For instance, we are at this point, on the Illinois Central, running to Chicago; also on a line running east and west. Nine miles south of us we reach another prominent line running to the east.

"The cost of shipment of live-stock from Chicago to New York, about 900 miles, is 50 cents per 100 lbs. live weight, or $100·00 (20*l.*) per car-load of 20,000 lbs. From here to Chicago we have now a special rate of $25·00 (5*l.*) per car-load. The regular rate would be a little over $31·00, or about 15 cents (7½*d.*) per 100 lbs. Of course there are some additional expenses for food, for attendance, yardage, &c., but these are not very great in the aggregate.

"In regard to cost of raising and feeding, I may say that, as prices for grain and labour have been for three or four years past, 4 cents (2*d.*) per lb. live weight would cover the actual cost of a well-fattened steer. About 3½ cents per lb. have been paid for thin steers to be fed. In one local market, 10,000 inhabitants, 4 cents per lb. are paid for light steers and the cows and heifers purchased by the butchers. At our butchers' shops we pay 7 or 8 cents for boiling pieces; 9 or 10 for roasts; and 12½ for the best steak. In Chicago something would be added to these prices. Of course we do not usually get the best quality slaughtered at our little towns. In this vicinity sheep are but little raised. It would be fair to add from ¾ to 1 cent. per lb. for the live-weight price of sheep over that of cattle of equal grade.

"A large farmer residing in Wisconsin, nearly 100 miles north of Chicago, writes me, that cattle fit for the English market are worth with him about $4·75 per cwt.; sheep, $5·50. The prices quoted are for actual live weight, as is the mode of sale throughout the West. In New York, on the other hand, sales are made on the estimates of the dressed weight, ranging from 55 to 59 lbs. per hundred of live weight. I need not remind you that here 100 lbs. is a cwt. Large numbers of sheep are being fattened year by year in that vicinity, Cotswold rams being crossed on the common grade Merino ewes. One farmer of that vicinity, in the early part of April, marketed 1800 wethers, averaging 123 lbs., in Chicago, and selling for $6·35 per cwt. As showing that good cattle can be reared in the northern portion of our western country, I may say my friend sold a car-load of high-grade Shorthorn steers in December last, which averaged nearly 1900 lbs. in Chicago—after shipment. The exact average was, I believe, 1892 lbs. These steers were three years old in the spring of 1876. Of course they were an unusually good lot.

"The great part of the cattle sold in Chicago are of the lower grades, but many of our farmers rear and feed excellent steers. In the State there are at the very least 100 herds of thorough-bred Shorthorn cattle, and thousands on thousands of cattle with a good share of this blood. Unfortunately, so far as the production of the best cattle is concerned, our feeders often find more profit in buying young steers from the small farmers than in rearing them. Those purchased, as a class, are not very good, but the price paid is small. This will gradually change, and the more rapidly if the demand for the better classes continues to increase.

"The prices named doubtless seem to you very small. I have given them in our currency, but the change is easily made; one 'cent' is worth very nearly a halfpenny; five dollars of our currency are not far from your pound. In thinking of these prices, you must bear in mind that our lands are comparatively low-priced, and that Indian corn is produced at a very small cost. In this vicinity—say this county—much of the land is worth no more than $30·00 to $40·00 per acre; some considerably less than the lower figure. Corn can be produced for, say, from 20 to 35 cents per bushel of 56 lbs. of shelled corn. A steer weighing 1500 lbs. will have eaten about 100 bushels of corn. This has been fed to him unground, unshelled, and often unhusked; the stalks, if they have been kept in good condition, being valued as not far inferior to hay. The only other food has been grass in summer, and a little hay in bad weather in winter. This steer will be worth, here, from $75·00 to $90·00, and will give a good profit. Or a steer, two years old, then in flesh, may be purchased now for about $30·00, weighing, say, 900 lbs. During the summer he will be grazed, and next winter will be fed, perhaps 35 or 40 bushels of corn, and be sold either during the winter or in summer for about $60 00 or perhaps $70·00. These cattle are not stall-fed. Some have very little shelter, but the careful farmer will provide sheds for them.

"I have not spoken of the great extent of productive lands lying west of us, as in Kansas and the vast area of Texas. In much of this further west, the only disadvantage is the greater distance for shipment, to counterbalance which they have much cheaper lands, and produce corn even more cheaply than we. Of course the Texan cattle are driven long distances before they are shipped by car.

"My own view has been, that this business of the shipment of dressed beef and mutton would continue to extend until it reached very great proportions. I have not felt, however, that it would prove so serious an obstacle to your farmers as many of them seem to have thought. I do not expect the shipments of live-beef cattle to increase to anything like the same extent; there are greater risks to be run, and greater costs to be borne. I think it very probable that we shall have a great increase in the amount of dressed beef transported by cars in this country from the west to the east. The experiments with the so-called 'refrigerator-cars' seem to promise good results. They are now largely used for the transportation of butter, cheese, &c. Only to-day I notice the arrival at Chicago of a car-load of beef, shipped from Western Kansas, and arriving in good condition, with only one change of ice. The weather, however, it is fair to say, is cool, even for the season.

"Special cases, if fairly reported, may be of more interest than general statements. Here I give the following bit of our own experience. Yesterday we sold at Chicago 16 steers, fattened on the University farm. The average weight at Chicago was 1331 lbs. They sold for $5·30 per cwt., or $70·54 each. It is usual to add some 50 lbs. as the shrinkage of a steer by being carried to market. On the 1st of January these steers averaged, at the farm, 1170 lbs. They were then valued at 3½ cents per lb., or about $41·00 each. Deducting expenses of sending to Chicago, and we have about $27·00 as payment for food and labour. They have eaten less than 40 bushels of corn each, their only other food being corn-stalks and a very little hay. We are now grazing 50 steers to be fed next winter, or perhaps sold in fall, as grass fed, if we find it profitable.

"If there be any other information I can give, I trust you will call for it.

"With much respect, yours truly,

"G. E. Morrow."

LAND TRANSIT AND TREATMENT.

Where railways are available, cattle are carried to the Chicago stock-yards at rates which vary according to the distance, or according to special arrangements. In one instance only have I been able to obtain definite quotations of freight-rates on cattle carried by rail, but this will be sufficient for my purpose. I quote from Professor Morrow's letter which is printed in full above: "From here to Chicago" (128 miles) "we have now a special rate of 100*s.* per car-load" (20,000 lbs.). "The regular rate would be a little over 124*s.*, or about 7½*d.* per 100 lbs. Of course there are some additional expenses for food, for attendants, yardage, &c., but these are not very great in the aggregate." The whole expenses on cattle coming 128 miles to market, including everything until they are sold, thus amount to less than one farthing per pound of dressed meat.

The cattle purchased for exportation are sent from Chicago to New York by rail, "shipped," as the Americans somewhat strangely term it. The distance is variously stated at 900 to 1000 miles—a matter of 100 miles is of little moment in Western travel! The cost of transit is fifty cents per 100 lbs. live weight, or 400*s.* per car-load of 20,000 lbs.—less than one half-penny per pound of dressed meat. The cattle trains run 300 or 400 miles at a stretch, after each of which the cattle are taken off the cars to be fed, watered and rested. They rest usually twenty-four to thirty-six hours each time, sometimes less than twenty-four hours, according to circumstances. The rate from Chicago to Philadelphia is 22½*d.*, and to Baltimore 20*d.* per 100 lbs., live weight. The cattle lose weight during the journey. Mr. L. F. Allen of Buffalo, from whose letter I have previously quoted, says: "It is usually estimated that, as a rule, good cattle lose 100 to 150 lbs. in live weight during the route from home to market in New York or Philadelphia, much of their shrinkage in weight depending on their condition when started from home." This estimate shows a serious shrinkage, but the loss of actual flesh is, of course, much less than this.

Arrived in New York, the cattle are unloaded direct into the stock-yards of the New York Central and Hudson River Railroad Company, at the foot of 60th Street, and are not driven at all along the roads or streets. They remain in the yards 24 hours, to allow them to become cool and tranquil, before being slaughtered. The slaughter-house occupies a portion of the immense cattle-building there located—an edifice the largest of its kind in the world. The animals selected for slaughter are taken from the yards into a central passage in the basements of the buildings, and thence into pens which open directly upon the shambles. The door of a pen is opened, a hooked rope from one of the many huge pulleys above is hitched around both hind legs of a steer, and before the animal has time to realise the sensation of being hung up by the heels, a knife has pierced his throat, and the blood gushes forth,—he never does realise it, in fact. Instantly a number of men attack the carcass, each of whom knows his appointed work. In a very short space of time the hide and offal are removed, and the carcass—after hanging an hour or two in the open, during which the steam and animal heat escape—is moved away along the iron railways suspended from the beams overhead. In these shambles an ox is killed and dressed, on an average, in *three minutes*, during the whole of the working hours. After the carcass has ceased to steam, and its natural heat has to a great extent passed away, it is at once conveyed to the shore refrigerating-rooms, and quickly reduced to a temperature of 40°; the various overhead tracks lead to the cooling-rooms, of which there are six, three on each side of the building, and the carcasses are moved, without any lifting, directly into these rooms. Here they remain 48 to 50 hours generally, or until they are wanted for shipment.

It is very important that the meat should be well prepared on shore before being shipped, that is, well cooled before any decay whatever has set in. In hot weather, especially, the well-being of the meat after shipment, and especially after its arrival in England, depends to a very great extent on the care with which it has been prepared on shore. The shippers now fully comprehend the importance of this stage of the process.

The shore ice-box is a huge double-walled room, placed in the story above the cooling-rooms, and capable of holding more than a hundred tons of ice. It has no openings, save one in the top through which the ice is let down, and the necessary openings for the circulation of the air which is driven among the blocks of ice. The circulation of the air, through the ice first and then through the meat below, is kept up by a powerful fan which is driven by steam-power. This fan forces air in at the top, and the current, descending, passes through the ice, thence through the openings at the base of the ice-room sides, forward down the inside of the meat-room walls, from whence it emerges near the floor, and directly under the meat. Meanwhile the fan draws the hot air from the top of the cooling-rooms, constantly replacing it with cold air forced in below. After the meat is thoroughly cooled it is cut into quarters, sewn up in strong canvas bags, and sent aboard the steamers. There are several export slaughter-houses in New York besides the one I have described. That one belongs to T. C. Eastman and Co.

The offal is thus disposed of: the blood is manufactured into a fertiliser; the hearts and livers are sold for food, being made into what the Germans call "Bologna;" the tallow is taken from the warm entrails, which are then thrown, with the rest of the refuse, into a tank and manufactured into a fertiliser. The value of the offal, blood, &c., is six or seven shillings.

OCEAN TRANSIT AND ARRIVAL.

The shipping-companies charge the exporters of fresh meat a given price for storage-room on board ship, generally 25*s.* to 30*s.* per ton space of 40 cubic feet, ship's measurement. A ton space is said to contain, on an average, only one-third of a ton of meat. Considerable room is necessarily lost amongst the quarters of beef and carcasses of mutton as they hang; and in addition to this there is the space occupied by the ice-room, in which no meat at all is, of course, hung, and which occupies, perhaps, one-fourth or one-fifth of the whole space allotted. The freight per ton of meat will consequently be about 4*l.* or, say, a half-penny a pound at most; or, in other words, 27*s.* 6*d.* to 30*s.* per carcass, on the average. The value of the offal of these cattle more than balances the cost of keeping the cattle in New York until they are killed, of slaughtering, and of refrigerating the carcasses on shore; and the total cost, therefore, of conveying cattle alive from Chicago to New York, and dead from the latter place to Liverpool, is thus less than one penny per pound on the meat, or, say in round numbers, 3*l.* per carcass. On the other hand, the ocean freight on live cattle is 8*l.* 10*s.* per beast, as against 30*s.* per carcass, dead. This enormous disparity will tend to limit the exportation of live cattle even in summer-time, and to totally stop it in winter. The dead-meat trade, however, requires that refrigerating-stores be provided to receive the meat on its arrival in this country, and it will then be established on a secure foundation.

The arrangements in our ports for receiving the Transatlantic cargoes of dead meat are at present far from what the trade really requires. While the meat is still in mid-ocean, the agents on this side do what they can to dispose of it, for immediate delivery on arrival. Failing this, they have the privilege of keeping it a few days on board ship in the refrigerating-rooms. There are at present no warehouses erected to receive the meat and to keep it at a low temperature, except the one in London belonging to the Fresh Preserved Meat Agency. But when it is discharged from the ship the meat is sent off by rail to various parts of the kingdom, in vans whose only preparation for keeping the meat cool *en route* are a few holes at each end to admit of a current of air passing through the meat inside. As far as they can be, the meat-trains are despatched during the night, and the cool night-air is of service to the meat during the warm weather. In the cold months the unfavourable conditions through which the meat has to pass are, of course, greatly reduced, and in the coldest weather are entirely removed.

TABLE III.—STATEMENT of the Quantity and Value of Fresh Beef exported from the United States to Great Britain during the Nineteen Months, ended April 30, 1877. (Prepared by the Bureau of Statistics.)

Month.	From New York.		From Philadelphia.		Total Exports.	
	Pounds	Dollars	Pounds.	Dollars	Pounds.	Dollars.
1875.						
October ..	36,000	2,800	..	..	36,000	2,800
November	36,000	2,800	..	..	36,000	2,800
December	134,000	10,400	..	..	134,000	10,400
1876.						
January	162,000	12,700	..	..	162,000	12,700
February	292,000	24,000	..	..	292,000	24,000
March ..	302,000	24,300	..	..	302,000	24,300
April ..	1,256,000	106,400	..	..	1,256,000	106,400
May ..	1,012,000	77,400	..	..	1,012,000	77,400
June ..	1,140,000	88,000	..	..	1,140,000	88,000
July ..	1,170,200	101,250	..	..	1,170,200	101,250
August ..	1,365,000	134,811	..	..	1,365,000	134,811
September	2,451,550	218,005	..	..	2,451,550	218,005
October	2,569,075	224,730	150,610	14,308	2,719,685	239,038
November	2,974,480	275,550	1,219,500	115,852	4,193,980	391,402
December	3,036,980	257,843	737,500	68,062	3,774,480	325,905
1877.						
January	1,796,000	185,550	776,450	69,880	2,572,450	255,420
February	3,605,610	293,838	1,348,000	127,619	4,953,610	421,457
March ..	6,262,355	547,762	445,500	42,323	6,707,855	590,085
April ..	6,022,013	595,472	2,556,200	242,839	8,578,213	838,311
	35,623,263	3,183,911	7,233,760	680,883	42,857,023	3,864,794

The agents in this country are generally reluctant to give any particular information about the trade. I am, however, glad to be able to present the following valuable letter which Mr. D. Tallerman has been good enough to write at my request. The letter gives a good description of the various aspects of the trade in this country, and it is all the more important as it is the only information of value, relating to this portion of the trade, that I have been able to obtain:—

"The Fresh Preserved Meat Agency (Limited),
"84, Upper Thames-street, E.C.,
"July 9, 1877.

"Dear Sir,

"Replying to your enquiries in reference to the Importations of Fresh Meat, from America, I may briefly say, for your information:

"1st. The consignments consist almost entirely of beef, mutton forming but a very small portion of the imports; veal and pork have only been occasionally received as trial parcels.

"2nd. The consignments are principally received at Liverpool; London, Glasgow, Southampton, and Bristol receive shipments, but the quantity of all in no way approaches the imports of the first-named port.

"3rd. The Liverpool shipments are disposed of in that town and district, and in the surrounding districts of Lancashire, Yorkshire, and the Midland Counties, and a large quantity is also sent to the London market.

"4th. The Glasgow shipments are sold in Glasgow and Edinburgh, and are also forwarded southward as far as London.

"5th. The Bristol shipments are of comparatively recent date, and are consumed in the locality, and in the West of England, and South Wales district.

"6th. The Southampton shipments are sent to London; it is very likely they will cease, as the consignees complain very much of the expensive charges at that port.

"7th. The London market receives the unsold portion of all the consignments to the other ports, in addition to its own.

"8th. The quantities of all shipments are advised by telegraph, on the lading of the vessel, from America, and the agents of all the shippers do their best to sell before the arrival of the ship, and they have facilities for keeping the meat in the refrigerators on board the vessels for two or three days after the arrival, if they are so disposed.

"9th. There is no special provision for keeping the meat on its being landed, but it is weighed and loaded into trucks, and is transmitted, at present by special trains to London, and ordinary trains to the districts. The trucks are without any special means of refrigeration. It is delivered on the London market at a cost of 25*s.* per ton for freight from Liverpool, and 2*s.* per ton for delivery; the rates of freight from other ports are in the same ratio.

"10th. The commission charged to the shippers' agents is a private arrangement, according to the financial facilities offered to the consignors; that of the salesmen in the London market is 2½ per cent. on what they sell.

"11th. All the railways from Liverpool bring the meat.. The Great Western has, I believe, taken the greatest trouble in the matter, with the view of providing special trucks for carrying the meat in good condition.

"12th. The cost of landing and weighing in Liverpool is only a few shillings per ton, but I do not know the exact amount. The refrigerators on board the vessels are the property of the consignors, who pay a royalty to some of the patentees for the use of the patent; the terms vary.

"13th. The hind-quarters of beef sell readily, but the fore-quarters do not sell so well, and seldom bring their cost.

"14th. The quality of the beef is invariably good, but its condition upon arrival varies very much in accordance with the system of refrigeration adopted in its transmission, and the care with which the refrigerators have been worked.

"15th. Very little of the meat has arrived tainted, except from the imperfect systems of refrigeration and other causes, readily preventable. Some of the meat has reached the market in a musty condition, and affected with a peculiar stale smell, which renders it very objectionable.

"16th. The meat has a great tendency to become dark in colour on the outside after the canvas has been stripped from it; the unsightly appearance it thus attains largely affects the price which it realises.

"17th. The average price at which the meat has been sold throughout the year by the side may be taken at 6¼*d.* per pound, or 4*s.* 2*d.* per stone, in Liverpool, for freshly landed meat in good condition.

"18th. I am not in a position to state the amount of profits, and who makes them.

"19th. As near as can be gathered from the various returns, I estimate the quantity of meat imported from October, 1875, to end of June, 1877, from America and Canada, to be 63,028,472 lbs., about equal to 84,038 bullocks, taking the average weight to the beast of dressed meat as 750 lbs., which is a reliable calculation to make.

"20th. The greatest difficulty those engaged in the trade have to contend against is the precarious character of the market on this side, and the impossibility of obtaining a regular price for their shipments.

"21st. The trade is without any organisation, and it frequently happens that if two or three vessels arrive at the same time, and the weather is against holding, the trade refrain from purchasing, and endeavour to make a price against the shippers, who are compelled to realise upon the best terms possible.

"22nd. In this trade, prices are run so close that there is no margin for a variation in price, and a farthing per pound will frequently turn the scale between a shipment making a loss or gaining a profit. The meat costs from 5½*d.* to 6½*d.* per pound, with charges and contingencies paid.

"23rd. To remedy this great defect, and make the trade of a steady and reliable character, it is necessary to extend the system of refrigeration to the meat after it arrives here, by means of refrigerating-trucks and warehouses in all large centres of population.

"24th. The company with which I am connected have fitted up four chambers (Fig. 1) for the storage of meat and other perishable produce, that we believe will in a great measure tend to promote this end. The capacity of these chambers is nearly 200,000 (two hundred thousand) cubic feet, and they are sufficient to contain all meat necessary for the London market; the chambers are so constructed that they are capable of being maintained at any specified degree of temperature, irrespective of each other.

"25th. The transmission of meat by rail has also received our attention, and we are organising a system of special trains composed entirely of refrigerating-trucks, for the transport of meat; these are intended to run on the Continent, to supply this market from Austria, Hungary, Southern Russia, &c.

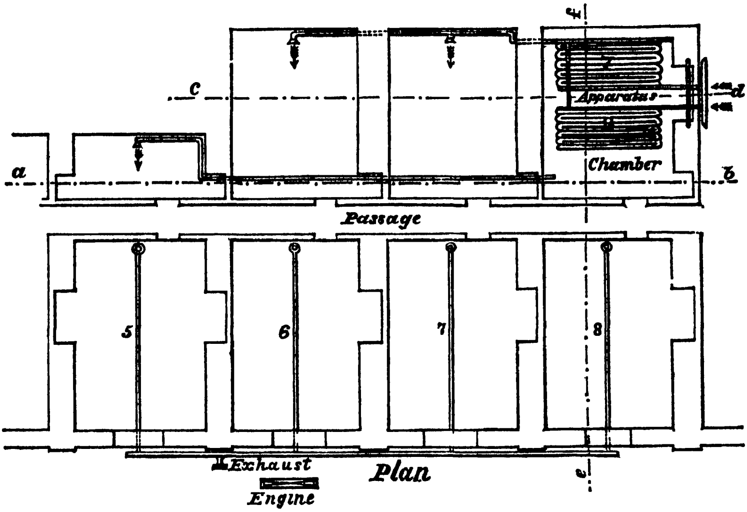
"26th. We also propose to place refrigerating-vans or trucks on the Home Railways, so that meat can be received and despatched without fear of deterioration.

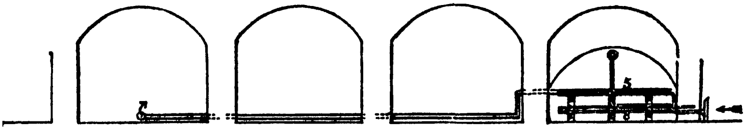
"27th. The prospect of obtaining large supplies of meat outside America are very good. On the Continent both cattle and sheep are to be obtained in large quantities, of both good quality and at fair prices.

"I am very truly yours,
"D. Tallerman.

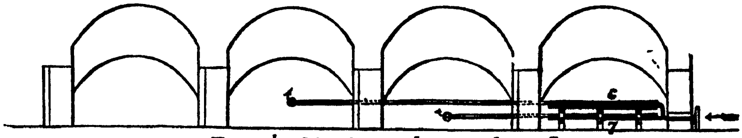
"J. P. Sheldon, Esq.,
"*The Brund, Sheen, Ashbourne, near Derby.*"

Fig. 1.—*Plan and Section of Refrigerating Chambers.*

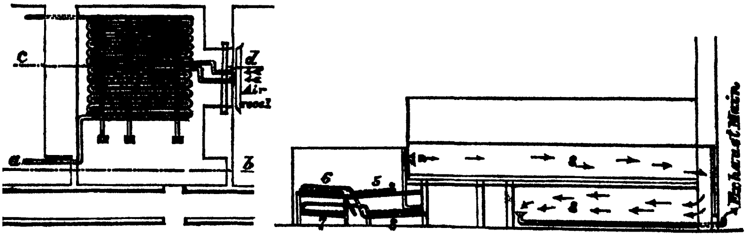




Longitudinal Section on line a.b.



Longitudinal Section on line. c.d.



Upper Plan. *Transverse Section on line e.f.*

CANADIAN RESOURCES.

The superficial area of the Dominion of Canada which is adapted to farming purposes is said to be about 2,300,000 square miles.* It is therefore about one-third smaller than the United States. I am speaking now only of that portion of the Dominion which is habitable; the "Wild North Land," beyond the limits of grains and grasses, is naturally out of all reckoning in this Report. The difference in size between the cultivable portion of the States and the cultivable portion of Canada is said to be more than made up on the part of the latter by her superiority over the former as a grazing country. Canada is less oppressed by a burning tropical sun, her summer is more temperate, and she enjoys a larger rainfall. These undoubtedly are great advantages in the raising and feeding of stock, and in general farm operations. Her summers more nearly resemble those of England. She can successfully raise not only Indian corn and wheat, in which the States have been supposed to excel, but root-crops of all kinds, cereals, and artificial grasses; and her hay-crop is heavy and of superior quality. The States, on the contrary, except in few and favoured localities, do not and cannot produce satisfactory root-crops for cattle-food; and, in the quality which is supplied by the finer natural and cultivated grasses, their hay-crop is inferior to that of the Dominion. Canadian farmers send hay to Chicago and the Gulf States, and still retain enough to feed their own immense herds through the winter. It must, however, be borne in mind that the Canadian winters are more severe, taking the country throughout, than are those of the States; therefore, with regard to climate, Canada is placed at a greater or less disadvantage in reference to cattle-feeding.

The following Table (p. 337) would seem to demonstrate that the agricultural development of Canada, in the thirty years preceding 1871, relatively has been much more rapid than that of the United States during the same period. This is attributed in part to the better agricultural climate of the former country.

To John Dyke Esq., Agent of the Canadian Government in Liverpool, I am indebted for the following interesting compa-

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* The total area of Canada is much larger than this, and probably falls little short of, if it does not exceed, the area of the United States.

TABLE IV.—SHOWING the INCREASE in OCCUPIED LAND, in HORSES, OXEN and COWS, SHEEP and SWINE, from the YEAR 1842 to 1871, inclusive, in the DOMINION of CANADA.

Year.	Lands		Total Occupied Acres.	Horses.	Cows and Oxen	Sheep.	Swine.
	Acres under Cultivation	Acres Occupied, but not Cultivated.					
1842	1,751,528	4,461,198	6,212,726	113,647	504,963	575,730	394,366
1848	2,546,925	5,866,666	8,413,591	151,389	565,845	833,807	484,241
1852	3,705,523	6,123,132	9,828,655	201,670	744,264	967,168	571,496
1861	6,051,609	7,303,287	13,354,896	377,681	1,015,278	1,170,225	776,001
1871	8,833,626	7,329,050	16,162,676	489,001	1,403,174	1,514,914	874,664

rison between the agricultural progress of the Province of Ontario and that of the United States:—

"Taking as the basis of calculation the official volume which contains the agricultural results of the last census of the United States, and the similar census returns for Canada, referring to nearly the same period, it can be demonstrated that Canada, and Ontario especially, instead of lagging behind the United States in every element of progress, as some people are constantly telling us, can put the tabular statements of her products and her progress side by side with those of the Great Republic on her borders, and not suffer one whit from the comparison, but that, on the contrary, she is shown to be considerably ahead of the United States in many important indications of a skilled and productive agriculture, and a rapid general advancement. The following is a summary of the results obtained by a comparison of the official statistics above mentioned, as regards Ontario.

"In nine years she added 46·65 per cent. to her population, while the United States in ten years added only 35·58 per cent. to theirs. She maintained a *decennial* rate of increase greater by one-half than that of the whole of the United States and territories; more than *double* that of all the United States, excluding the Western States, and only falling short of the increase in the Western States and territories by 7 per cent. In nine years she added nearly sixty-four cultivated acres to every hundred acres in cultivation in 1851, while the United States and territories in ten years added only a little over forty-four acres to every hundred acres under cultivation at the date of the previous census. She subdued her wild lands more rapidly than even the growth of her population, and at a rate almost double that in the United States; the proportion being as 17·10 to 8·72. The cash value of farms in 1860, per head of the population, was greater in Ontario than in the United States, being $211·42 in Ontario, and $211·33 in the United States. Their value per acre was greater in Ontario than in the United States by nearly $6, being $22·10 per acre in Ontario, and $16·32 per acre in the United States. The capital invested in agricultural implements was greater in Ontario than in the United States in proportion to the breadth of land cultivated, being $186 for every hundred acres of cultivated land in Ontario, and $150 for every hundred acres of cultivated land in the United States. She grew more wheat in 1860 than any State in the Union. In proportion to population, she produced in that year more than three times as much wheat as the United States, raising 17·64 bushels for each inhabitant, while the United States raised only 5·50 bushels for each inhabitant. She was greatly ahead even of the Western States as a wheat-producing country, the average production of wheat in the whole of the Western States being only ten bushels for each inhabitant. Of the nine leading staples of agriculture, common to both countries—wheat, Indian corn, rye, barley, oats, buckwheat, peas, beans, and potatoes—she produced 55·95 bushels for each inhabitant, while of the same articles the United States produced only 43·42 bushels for each inhabitant. Excluding Indian corn from the list, she produced of the remaining articles, 54·34 bushels for each inhabitant, against 16·74 bushels for each inhabitant produced in the United States. In proportion to population, she had more capital invested in live stock than the United States, the value of live stock owned in Ontario being $38·13 per head of the population, while in the United States it was $34·64 per head of the population. For every hundred of the population, Ontario owned 27 horses, and the United States only 20. For every hundred inhabitants, Ontario owned 32 milch cows, and the United States only 27. For every hundred inhabitants, Ontario owned 84 sheep, and the United States only 71; of live stock, in the number of pigs only was she exceeded by the United States, in proportion to population. In 1860 she produced 19·22 pounds of butter for every inhabitant, while the United States produced only 14·62 pounds. In the same year she produced 2·62 pounds of wool for each inhabitant, while the United States produced only 1·92 pounds. In the nine years from 1851 to 1860, she increased her annual production of butter by 67 per cent., while in the United States, in ten years from 1850 to 1860, the increase in the production of butter was only 46½ per cent. And in nine years she increased her production of wool 40 per cent., while in ten years the United States increased their production of wool only 15 per cent.

The foregoing information is issued with the authority of the Government of Ontario.

Mr. Dyke has also informed me, by letter, that "very large quantities of meat and cattle are exported *viâ* the United States, on account of cheaper freights, and that the Canadian ports are closed during the winter months. The steamers plying to Quebec in summer, run and take Canadian freight (in bond) from American ports in winter, such as Portland, Boston, Baltimore, Philadelphia, and large quantities of Canadian meat, cattle, and horses are also shipped from New York, which, upon landing here are all called American, much to our loyal Canadians' disgust. The export trade is of far greater importance to Canada than to the United States. Canada has few centres of population—Montreal, Quebec, Ottawa, Toronto, Hamilton, and New London, comprise nearly the whole. These markets are well supplied by the farmers in the immediate neighbourhood, whilst the surplus stock of the more remote districts has been exported to the large manufacturing centres of the Eastern States, upon which a duty of *twenty per cent.* has to be paid. In the years 1873 and 1874, 74,661 head of cattle, 571,494 sheep, and 14,863 horses were thus exported. It must not be assumed that the Canadian farmers are labouring at a disadvantage with their American confrères; on the contrary, as a set-off against the 20 per cent. duty, they are, comparatively speaking, exempt from taxation in Canada, as compared with the United States. They have no war-debt to pay, and therefore the public debt of Canada is about 4*l.* sterling per head, mostly for public works, canals, &c., whilst that of the United States is upwards of sixty dols., exclusive of State debts, which have nothing to correspond with them in Canada. *Canada is the most lightly-taxed country in the world.* The development of the exportation of cattle, horses and meat to Europe will prove an inestimable boon to Canadian agriculturists."

The following extract from the Montreal 'Journal of Commerce,' is the only reliable information I have seen published on the exportation of beef from Canada, and it cannot fail to be of interest to the readers of this Report:—

> "With unwavering increase since the first shipments in the fall of 1875, our Dominion beef export trade has to-day attained a surprising magnitude, when expressed in figures, and, when read as a chapter in our commercial economy, it is pregnant with domestic lessons and example. For the last three-quarters of the fiscal year, ending June, 1876, the exports aggregated 4,500,000 pounds, and during the first eleven months of the present fiscal year 45,000,000, an increase of forty-one million pounds. During the first five months of the present calendar year the shipments have been at the rate of 75,000,000 pounds per annum. The magnitude of our exports may perhaps be best estimated by taking alone the month of April last, when the shipments were at the rate of 100,000,000 annually. The value of shipments before the close of the year, it is estimated, will exceed one million of dollars; equal to about two hundred and sixty thousand pounds sterling. It is sufficient to add that our shipments of live cattle by way of Montreal far exceeds that from New York, extensive as the latter are, and hence controlling the cattle trade, as unmistakably Canadians now do, it remains for them to make good the advantage."

During the winter months, New York will continue to be the chief port for the exportation of both Canadian and American meat. In the summer and autumn, Canada will send at all events some of her cattle and meat to Europe direct from Quebec and Montreal. The export of live cattle will, however, in my opinion, not become so important a trade as that of dressed meat. Not economy alone, but humanity dictates this opinion. It is impossible that a voyage of three thousand miles should not cause considerable inconvenience on board ship, and suffering to the animals themselves; and the cost of ocean transit on live cattle is altogether disproportionately high—necessarily so as compared with that on dressed meat; the question of space accounts at once for this. The advantage of landing cattle alive on these shores is obvious—more particularly in hot weather; but the question of cost counterbalances it. Still, as it is said to leave a good profit, the live-cattle trade from the other side of the Atlantic will doubtless be persevered in, and will increase in summer-time.

The dead-meat trade commenced earlier than is generally known, and owes its inception to Mr. John Dyke, the Canadian Government Agent in Liverpool, who advocated the same through the columns of the Canadian press so long ago as 1871. Whilst on a visit to Canada in the winter of 1873–74, this gentleman made arrangements for a shipment to follow him to Liverpool. The particulars of the first consignment ever sent across the Atlantic as given in the Liverpool 'Daily Post' of February 12th, 1874, are worth preserving:—

> "*Interesting to Beef Consumers.*—For the last few days, and especially on Saturday, a curious sight has been seen at the bottom of Mount Pleasant, opposite to the Adelphi Hotel. There have been crowds around the wholesale provision shop of Mr. William Brittain, engaged in inspecting the cutting-up of sides of prime beef, and afterwards in purchasing pieces for consumption. On inquiry, it was found that Mr. Brittain had received by the Allan steamer 'Caspian,' which arrived in Liverpool last week, a very considerable consignment of fresh Canadian beef, which was being disposed of at the moderate prices of 6*d.* and 7*d.* per lb. for the prime parts. This beef, amounting to 12 tons, formed part of a consignment from Canada, consisting otherwise of 6 tons of salt beef, 1½ ton of poultry (geese and turkeys), and a half-ton of mutton. The whole had been carefully packed in rye straw, which has the special quality of absorbing any moisture from the meat, and arrived in first-rate condition.
>
> "The packing of beef in this particular manner will of course only be available during the winter season; but the winter season happens to be that in which, through the extra cost of fuel, domestic economies become requisite just at the time when an extra consumption of meat is a necessity of healthy life. It is understood that the present shipment is to be followed by others on a large scale. As to the meat itself, it is well known that careful housekeepers often hang up their meat at this season of the year for a time as long as that occupied by the Atlantic voyage, to secure the tenderness which is so great a desideratum of English dinner-tables. That the Canadian fresh beef is, at the same time, tender and sweet can be proved by experiment. It is desirable that the attention of persons charged with the victualling of Public Institutions should be turned to this matter, in order that they may, if possible, make considerable economies. The necessary arrangements for the receipt and disposal of this experimental consignment have been made by Mr. John Dyke, Agent of the Ontario Government in Liverpool.
>
> "The writer had the opportunity of testing a piece of sirloin, which was in all respects equal to ordinary English sirloins at 11*d.* and 1*s.* per lb; the poultry consignment was forwarded to London, where it has realised good prices."

Messrs. John Bell & Sons, the eminent Glasgow butchers and live-stock importers, have kindly sent me the information contained in the following letter:—

"170 and 172, Argyle-street, Glasgow,
"May 19, 1877.

"DEAR SIR,

"We are in receipt of your favour of yesterday, and have much pleasure in replying to your queries.

"The trade in American live cattle was first commenced by ourselves in 1873. In June and July of that year we imported several pairs of bullocks, to see if they would live during the voyage, and were induced to do so by the extremely high prices current for cattle at that time. Finding that the cattle stood the voyage well, the writer started for New York in July of that year, and began as a regular trade that which has now become such a large one.

"At first our shipments were only about six cattle in each steamer of the Anchor Line, but before the end of that season we shipped fifty in one steamer. The only Steamship Company that would entertain our proposals at that time to carry cattle was the Anchor Line; but now they would be all very glad to do so, as they see that it is profitable.

"The cattle are fed during the voyage on hay and Indian corn, and in good weather suffer but little in condition, nor do they lose much in weight; but in rough weather they fall off considerably. We have already had one cargo of cattle this season into Glasgow, which all arrived safely and in good order, and expect our first regular shipment to arrive about Wednesday of next week, when we will be glad to see you; there are 154 cattle in it. We shall have about the same number almost weekly thereafter.

"The freight is 7*l.* per head, shipper paying for fittings, food, and attendance; ship only providing space and water.

"On Thursday last there were three American bullocks sold at 46*l.* each, which were sold by us last autumn to a Fifeshire farmer, and fed by him all winter and turned out in splendid order.

"We have not had many sheep as yet, as sheep in the States have principally been reared for wool; but now that a market for mutton has opened up, we may soon expect to receive large numbers.

"We will be glad to supply you with any further information.

"Yours truly,
"JOHN BELL AND SONS."

Practical men accompany the cattle from America to this country—on the average, one man to each twenty or twenty-five head of cattle. These men come with one steamer and return with the other, a much more satisfactory arrangement than formerly existed, of picking men up to attend the cattle, offering them in payment a free passage to Britain.

On the morning of July 12th, I went to see S.S. *Dominion*, which had just then arrived in Liverpool from Quebec with 215 Canadian fat cattle on board. I must admit that the cattle to all appearance had suffered less during the voyage than I had expected to find was the case. The bulk of them were in as good order as the generality of Irish cattle which are landed in Liverpool or in Holyhead. A few of them were a little bruised, and in some cases the skin was off in patches here and there, but none of them had suffered seriously. Most of these cattle were the fag ends of large herds from which previous cargoes had been drafted; but they were nevertheless a very useful lot, and would do credit to any country whatever. Some of them, indeed, were exceptionally well-bred and well-fed animals. Five of them were especially excellent in these respects, one being a very remarkable animal. This one was a noble-looking bullock, fat and docile; the following are his dimensions, taken on the spot:—

	Feet.	Inches.
Length from root of horns to root of tail	8	9
Girth behind the shoulders	9	4
Height to tip of shoulder	5	8

When he left Quebec, this animal weighed 3600 lbs. His dead-weight of flesh, at 57 % of the live-weight, would be 2052 lbs., or 146½ stones of 14 lbs. to the stone. Of the other four, three were splendid bullocks, and the remaining one a beautiful heifer—all fattened in a superior manner, and averaging about 100 stones net weight. All five of these animals had a great deal of shorthorn blood in them; the heifer being almost, if not quite, pure bred, handsome in colour, and of nearly faultless symmetry. These cattle were bred and fed by Mr. Snell, of Guelph, Ontario.

During the summer-time, at all events, the live-cattle trade promises to partly supersede that of dead meat from Canada, whatever it may do from the States. A large proportion of these cattle are stalled on the upper deck where they displace no other cargo, as none at all would otherwise be carried there; a temporary shedding of boards is put up along the sides of the ship, the cattle—a row of them on each side—facing each other. They are well bedded, and stand in pairs as in ordinary shippons, a trough for corn and water being placed conveniently in front of each pair. They are as comfortable as possible under the circumstances, though standing very near together to keep them steady when the ship rolls and pitches. During the voyage they are fed on hay and a mixture of Indian corn, meal and bran, &c.—fed, in fact, as they are before they leave their homes, as nearly as may be.

The quantity of dead meat sent from Canada has been quoted to me by Mr. Tallerman of London, as follows:—during 1876, the quantity amounted to 142,016 lbs.; January to March in the present year, 508,592 lbs.

I am indebted to Professor Buckland for the following interesting and valuable letter:—

"Toronto, Ontario,
"April 28, 1877.

"DEAR SIR,

"I have much pleasure in acceding to your request to furnish you with information, as far as I am able, on the trade in fat cattle and sheep that has been recently commenced between Canada and the Mother Country.

"I would observe, in reference to your principal enquiry, that in consequence of variations in soil and climate over so large an area as is embraced by this Dominion, it is exceedingly difficult, if not quite impossible, to get at the precise cost of rearing and fattening cattle and sheep so as to occupy a good position in British markets. The Province of Ontario, even, differs considerably in its capabilities of rearing and fattening live stock; the south-western portion of the peninsula possesses in this respect great advantages.

"Since the receipt of your letter, I have made enquiries of several of our most intelligent and experienced farmers as to the actual cost of producing fat beef and mutton of good quality in this and the more western portions of the province. From their statements, it would appear that improved cattle, reaching maturity at three years old, may be reared and well fattened for market at a cost of from $3·50 to $4·25 (14*s.* to 17*s.*) per 100 lbs. live weight, and fat sheep on an average for about $3·50 per 100 lbs. live weight, the value of the wool paying to a large extent the cost of keep and management.

"The following statement of the actual cost of producing well-fattened cattle, suitable for the English market, was communicated by one of our most enterprising breeders of fifteen years' experience:—

"Raising, feeding, and attendance of cattle the	first year,	per head	$24·00
,, ,, ,, ,,	second	,,	18·00
,, ,, ,, ,,	third	,,	24·00
"Total cost of fat beast weighing 1600 lbs. ..	(13*l.* 4*s.*)		66·00

This would be about $4·12½ (16*s.* 6*d.*) per 100 lbs. live weight.

"Our principal shipping ports for this province are Montreal in the summer, and Portland, in the State of Maine, during winter. But few live cattle are shipped during the severe months of the latter. From Toronto to Montreal, the cost of transport of cattle by railway will average $2 50 (10*s.*) per head, and for sheep 60 cents (2*s.* 6*d.*). One man is usually sent with every 20 or 25 head of cattle, whose business it is to feed and look after them. The food, supplied by the owner, consists principally of hay and crushed grain. From Montreal to London or Liverpool, the usual cost by steamer is, for cattle, $35·00 (7*l.*) per head, and for sheep, $7·50 (30*s*), the ship only finding water. Dressed meat is taken from Toronto to Montreal, at $50·00 (10*l.*) per 20,000 lbs., and to Portland for $75·00 (15*l.*).

"With reference to the extension of the trade from this Dominion, much, of course, will depend on the prices that may obtain in the old country. If farmers here can, on the whole, only realise a moderate profit, it will be much to their interest to use all practicable means for extending the trade, which will afford them what is so much needed—an increased supply of very valuable manure. Much of our old arable land has of late become seriously deteriorated by continued cropping with grain; and wheat in particular, hitherto our principal staple, has of late become a precarious production. Our soil and climate are generally well suited to the raising of hay, turnips, and most other roots, and in the south-western portion of Ontario maize admits of profitable cultivation, and can be raised in large quantities. Flax, too, succeeds well, but it is not yet much used for feeding purposes, and the same may be said of oil-cake. These products, so essential to the healthy growth and fattening of increased numbers of cattle, sheep, and pigs, of improved breeds, can no doubt be produced in sufficient quantities to meet any demand that may arise in the future.

"The live stock of the country is constantly increasing, and the improvement in quality of late years, especially of cattle, sheep, and pigs, has been quite remarkable. We have now a number of fine, pure-bred herds, particularly of Durhams, whose blood is to be found, more or less, in much of the ordinary stock of the older-settled districts. Our sheep, principally long-woolled, in point of size and quality are unsurpassed; or, more strictly speaking, not equalled on this continent. And when it is considered that our domesticated animals are subject to very little disease of any kind when properly cared for, and that rinderpest as yet is wholly unknown in this part of the world, and with the opening-up for settlement of the rich prairie lands of the great North-west, it is impossible to assign limits in the future to the production of animal food to meet the exigencies of whatever demand is likely to arise.

"Yours respectfully,
"GEO. BUCKLAND."

The statement in Professor Buckland's letter of the cost of raising and feeding cattle was based on estimates that referred more particularly to the western district of the Province of Ontario, which, for purposes of stock-raising and for other branches of agriculture, is more favourable than the eastern and northern districts:—

Detailed Estimate (supplied by Professor Buckland) of the Cost of Raising and Fattening a Three-year-old Steer in less-favourable Districts.

	Dollars.	
First Year.		
6½ months' pasturage	2·00	
195 lbs. meal at $1·25 per 100 lbs.	2·44	
5½ months' winter feeding:—		
990 lbs. of hay at 60 cents per 100 lbs.	5·94	
495 lbs. of meal	6·19	
83 bushels of turnips at 6 cents	4·98	
	——	21·55
Second Year.		
6½ months' pasturage	6·00	
5½ months' feeding in winter on straw-chaff, &c., in open yards with sheds	3·00	
900 lbs. of hay	5·40	
83 bushels of turnips	4·98	
	——	19·38
Third Year.		
6½ months' pasturage	7·00	
5½ months' feeding in stall:—		
1650 lbs. of hay	9·90	
123 bushels of turnips	7·38	
540 lbs. of meal	6·75	
	——	31·03
Total cost of raising and feeding a steer weighing 1600 to 1700 lbs. live weight—$4·18 per 100 lbs. live weight, or 3½*d.* per lb. dead weight (nearly 14*l.* 8*s.*)		71·96

In the foregoing estimate the food consumed is put at what is considered to be its actual cost. No charge is made for the calf, nor for the skim-milk on which it is fed during a portion of the first year, nor for attendance, as the value of the manure when it is properly cared for will, in great measure, meet these small expenses. The "meal" consists of ground peas, barley, oats, maize, or flax, and commonly a mixture of two or more of them. The turnips are invariably Swedes, of 60 lbs. per bushel.

In this calculation it is assumed that the animal is well bred, of good size and proportions, with a strain of Durham or Hereford blood. It is believed that such cattle can on an average be produced and ripened for the butcher, in the Province of Ontario, for the amount stated.

Mr. J. T. Warrington, of Montreal, exporter of Canadian produce, in a letter dated May 25th, writes to me as follows:—"The cattle are well cared for in transit, and are hayed and watered every 150 miles. On arrival here they are kept in the railway yards until the ship is ready to receive them; costs *nil*, commissions *nil*. Freights (ocean) for live cattle are too high by far just now, and should not be over half what they are. Freight 7*l.*; fittings 12*s.*; other incidental expenses, feed, care, &c., *en route*, 1*l.* per head. Cost of slaughtering cattle, 12½*d.* per head, sheep 2½*d.* Hides are worth 4½*d.* per lb. inspected; tallow 7 3½*d.* rough, 4½*d.* rendered. In the spring, mutton is worth 4*d.* to 5*d.*, beef 3½*d.* to 4½*d.* per lb.; in the fall, mutton is worth 2½*d.*, and beef 3*d.* per lb. This is for prime stock; you can buy beef as low as 1*d.* per lb. wholesale."

The cost of a Canadian ox weighing about 1600 lbs., when landed on our shores, may be summarised as follows:—

	£.	*s.*	*d.*
Cost of rearing and feeding	13	4	0
Transit to seaboard	0	10	0
Food and attendance, say	0	2	0
Ocean freight	7	0	0
Shipboard fittings	0	12	0
Food and attendance	1	0	0
	£22	8	0

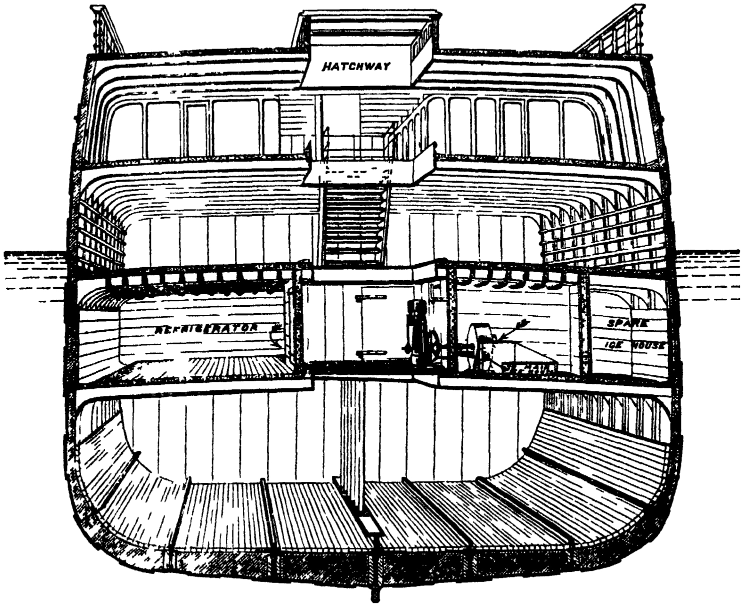
The weight of dressed beef in a beast whose live weight is 1600 lbs. will be, at 57 per cent., 912 lbs. Costing 22*l.* 8*s.* such a beast would be close on 6*d.* per lb. net weight when landed on our shores. But the foregoing summary represents the actual cost only of the animal on arrival, which is not enough. There are the farmer's and dealer's profits, and the loss in shrinkage of animal during transit, to be added. These items, of which it is impossible to give exact figures, would not amount to much less than 1*d.* per lb.; but as a set-off there is the value of the offal (less cost of slaughtering), which would reduce the beef to, say, 6½*d.* per lb. when the beast is slaughtered. Fine quality of Canadian beef, landed on our shores at a net cost of 6½*d.* per lb., gives a very handsome profit to our wholesale and retail butchers, as compared with what English-fed beef gives them.

The value of the offal in New York is as follows:—livers, 1*s.* 9*d.* to 1*s.* 10*d.*; hearts, 9*d.* The heart, liver, head, hoofs, and entrails are worth altogether from 5*s.* 10*d.* to 6*s.*

METHOD OF REFRIGERATING ON BOARD SHIP.

On the 21st of March I inspected, in Liverpool, a cargo of beef and mutton on board the White Star ship, 'Celtic,' which had just arrived from New York. I was present when the refrigerating-rooms were opened, and the beef and mutton exposed to view. These rooms run along either side of the ship, and the quarters of beef are suspended in them from hooks in the ceiling. Some of the carcasses of mutton lie underneath, on the floors of the compartments. Each quarter of beef and each carcass of mutton is sewn up nicely in coarse but clean canvas. The quarters are hung as closely together as possible, interlocked in a peculiar manner, as well to economise room as to save them from being bruised by the rolling and pitching of the ship in mid-ocean. Whilst on board, whatever it may be afterwards, the meat is not at all "messed," and what I saw was to all appearance as fresh as if killed only the day before. I was present whilst a great deal of the meat was discharged, and I examined many specimens of it, finding nothing whatever about it which could be regarded as objectionable, either in appearance or in odour. On the contrary, all of it was scrupulously clean, fresh, sweet, and in good order in all respects. The very blood on the "sticking-parts" was quite fresh-looking. None of the meat was damp, or flabby, or faded in any respect, nor had the juices gravitated towards the bottom of the quarters as they hung, or discoloured the canvas. It was, indeed, evident to the most unpractised eye that the process of decay in this meat had been, during the whole voyage, most thoroughly and perfectly suspended. Nor does the temperature of the rooms approach nigh to freezing-point; it is maintained at 37° to 40°. Given the same conditions, the meat would safely make a voyage round the globe. This system, so far as I can learn, is the best of the three or four in use. The refrigerating-rooms (Fig. 2)—if they merit the name when they do not freeze what they contain — are as perfectly air-tight as possible. They are constructed of several thicknesses of boards, with non-conducting material between them. The apertures in the sides of the rooms, through which the meat is extracted when it is being discharged, extend from near the floor to near the ceiling, say some 5 feet 6 inches square, leaving a rim against which the removable door is tightly bolted; a flange of India-rubber coming between it and the rim all the way round. This door itself also consists of four or five thicknesses of board, which are interspaced with air-tight and non-conducting material, similar to the walls of the rooms, and it is firmly fastened to the walls.

Fig. 2.—*S. S. 'Sardinian,' as fitted with Wicke's Patent Refrigerator—looking forward.*



At the head of the two rooms running down the sides of the ship—the meat-rooms—is a room whose walls are of zinc; this room is filled with blocks of ice. In this room is a fan driven by steam, which causes a current of cold, dry air to continually circulate through the whole space of the rooms which contain the meat. This current of air enters the meat-rooms near to the floor of the ice-room, and is withdrawn from them by means of a boarded channel which runs from the ice-room along the floor of the meat-room to the far end, and thence rises to near the ceiling. The withdrawal of the air thus occurs at the point farthest away from the ice, and near the ceiling, to which the air, whether vitiated or not by damp or odour, is compelled to rise. The fan does the double duty of driving the air through the meat-rooms, and of bringing it back to the ice-room. Thus the air circulates continually, first through the ice then through the meat-room. By passing through the ice-room the air loses each time by condensation any moisture it may have contracted in its journey amongst the carcasses, and it is consequently sent again on its mission dried and purified. The dryness of the air is one of the main features in the system. The whole arrangement is very simple, though it can scarcely be regarded as inexpensive. But in any case it is thoroughly effective, and the successful importation of dead meat from the other side of the Atlantic is now a *fait accompli.*

In the side of each meat-room a thermometer is fixed, which indicates the temperature inside, and this can be accordingly regulated as desired. This is done by increasing or diminishing the current of air. T. C. Eastman & Co., of New York, whose arrangements I have here described, have, as I was informed by Mr. Lippincott, their Liverpool manager, never yet lost a single carcass by their process of refrigerating; and they were the first, as they are now the largest exporters. It is true that other companies have had damaged cargoes at times, but these have always resulted from one or other of two causes—the supply of ice running out, or a break-down in the machinery. Experience will obviate the recurrence of these mishaps—they are too costly to be continued.

I purchased in Manchester a piece of standing-ribs of the beef which had come over in the 'Celtic,' taking pains to assure myself that it had formed part of the cargo I had inspected the day before. This piece of meat was several days in "muggy" weather before being cooked, and the signs of decay in it then were very slight. We ate a portion of the meat warm and the remainder cold; I had several friends in to taste it, and they all pronounced it as good as very fair English beef. This was my opinion of it, too. I gave 9½*d.* per lb. for it.

On the 14th of May, in company with Mr. H. M. Jenkins, I inspected the cargo of meat on board the Guion steamship, 'Wyoming.' I need not describe this, as the foregoing description of the 'Celtic,' and her cargo of meat, applies in all respects equally to the 'Wyoming' and her cargo—except, perhaps, in the situation of the meat-rooms; but this is a difference of no consequence, for the principle is identical in both.

A newly-invented system of refrigerating-rooms promises soon to supersede the use of either natural or artificial ice. The following is a description not only of the invention itself, but of the manner of its operation, and the effect produced. I am assured on excellent authority that the invention is a most valuable one, and that it is destined to come into general use in the place of the other refrigerating-systems now in vogue:—

"The method applied for producing the desired temperature is simplicity itself. There is an entire absence of the chemical processes employed in artificial freezing, such as ether, ammonia, hydro-sulphuric acid, or the salts of potash or ammonia. All that is used is a simple mechanism for compressing the ordinary atmospheric air, and subjecting it, whilst under pressure, or rather while it is in the act of expanding from pressure, to the action of a jet of cold water, which, thrown suddenly upon the air deprives it of its heat, and the atmosphere thus cooled passes into the chamber the temperature of which it is intended to reduce. A retort from which to draw the air to be operated upon, a couple of cylinders for compressing, a small pump to supply the stream of water, and a freezing-chamber are in reality all the mechanism used in the combination, with, of course, the ordinary motive-power. The idea of compressing air for cooling purposes is not new; but it is only of late years that it has been brought into practical operation. The inventors of the machine under notice are Messrs. Giffard and Berger, of Paris, the first-named gentleman being a brother of the celebrated aeronaut of that name, and inventor of Giffard's Injector. The machine we have had the opportunity of inspecting has been erected (in a temporary building near the Municipal Offices) merely for trial purposes, and of course could not be judged of under favourable circumstances, the freezing-chamber being of wood, and the room in which it stands not being sufficiently protected from the entrance of the external atmosphere. The results, however, were surprising. In half an hour after commencing to work the machine, the thermometer within the freezing-chamber stood at 20° below zero; the interior of the chamber was covered with hoar-frost half an inch thick, bottles of water were frozen solid, and the general temperature of the room in which the freezing-chamber stands was reduced to 30° Fahrenheit, or the freezing-point. The longer of course the cooling process in continued, the more the temperature of the room receiving the cold air will be lowered, as the atmosphere thus rarified is capable of being pumped back into the retort, and is necessarily more susceptible to the treatment employed than the external air. Generally the cooled air is delivered into the room 50° below the outside temperature, and the cold can be maintained at an average of 15° Fahrenheit, or above or below that temperature as required. A machine of the size of the one alluded to is capable of being worked by an engine of five-horse power, and will distribute 300 cubic metres of air per hour. Ordinarily the air discharged from the refrigerator is moist, but by a simple contrivance it can be rendered quite dry.

"One of the advantages claimed for the invention is that it will produce ice much cheaper than any other refrigerating process at present in use, and in this respect its economical benefits must commend themselves. But the more obvious uses to which it can be applied, and which have called forth its present introduction, are in connection with the fresh-meat trade already referred to. If the machine is capable of what is stated, its superior application to the preservation of fresh meat on board the Atlantic steamers is apparent, and it is expected before long that it will supersede the present appliances. With that view a company is being formed in London, the promoters being Messrs. Gittins and Company, the immediate object of the undertaking being to import large quantities of beef, mutton, poultry, game, &c., from Canada and the United States, for the metropolitan and other wholesale markets. The promoters will add to their facilities by having depôts in Liverpool and London, each fitted up with the refrigerators, so that every facility will be had for keeping the meat fresh and good for a sufficient length of time. There are, however, numerous other objects to which the invention can be beneficially applied; in short, its utility will be obvious in all cases in which a low and regulated temperature is required. For instance, it is adaptable for keeping cabins and engine-rooms cool in hot climates, for hospitals in hot countries, for brewers and distillers in keeping their worms cool, and also for the manufacture of chocolate, and in candle-works. Its simplicity, comparative inexpensiveness, as well as its non-liability to get out of order, constitute the machine a desirable one, and capable of very general as well as special application. Among the other uses, also, to which it is suggested it may be put is that of keeping cool, during summer, warehouses in which bacon and lard are stored, and the cooling of public markets, abattoirs, &c. As a scientific invention, however, the success of the machine is quite demonstrable; its practical utility the patentees and promoters will, no doubt, be prepared to show in due course.

AMERICAN IDEAS OF THE TRADE.

The meat trade is naturally attracting considerable attention in America. It is a source of wealth to the farmers of that country, new and unexpected. They see in it a powerful impetus tending to the development of the vast agricultural resources of their country, and they hail it accordingly with considerable satisfaction. It may be said to have caused a feeling of satisfaction amongst American agriculturists almost equivalent in volume to the feeling of dismay with which farmers on this side regarded it for some time after it commenced. Subsequent discussion seems to have toned down the feeling somewhat in both countries, particularly in this. The general impression in the States, among the exporters, farmers, and cattle-salesmen, is, that the trade will speedily become a very large one; that it will assume a permanent character, and that it will be carried on quite as successfully, or at all events relatively so, in summer as in winter. They consider the supply of cattle to be already nearly unlimited, and that in the near future it will become, for all purposes of the trade, quite inexhaustible. They also think the rates of conveyance, overland and over-sea, will remain as they are at present, or at all events that they will not advance much; and they believe that the cost of production of beef and mutton, for a long time to come, will remain as low as it is now. They do not consider that the export trade will materially affect the retail prices of meat in New York—except perhaps of the best qualities, because it is of these that the exportation almost exclusively consists at present. The better qualities have been raised about one cent per pound by the retail butchers, but it is not thought that the exportation alone will bring about a further increase, at all events not for some time to come. In fact, the cattle already exported to this country seem to have been for the most part surplus fat stock, which in the present depressed condition of trade would have been difficult to get rid of in the home markets at remunerative prices. Time will, I believe, more or less modify these opinions in several respects; the Americans are, however, in a far better position than we are to estimate the extent of the resources on which the new trade hangs, and that they will ultimately accomplish all, or nearly all, that is now claimed as the probable future of the meat trade, is at present certainly less within our capacity to deny than it is within theirs to affirm.

Among the general men of business in America the new trade has not aroused much interest; they know in a casual sort of way that such a trade has recently opened out, but beyond that they do not seem to care anything about it. The newspapers, we are told, have given it but scant notice, and in private circles it is but seldom the topic of conversation. The interest in it which has found expression is almost totally confined to the farmers, the butchers, the cattle-dealers and the exporters, but amongst these the interest is keen. They have so far convinced themselves that the trade is destined to go on increasing and prospering, that they are already at a loss to comprehend by what process of reasoning any one can come to think it is not. At the same time there is no element of philanthropy in their calculations—all is pure business, nothing else. They tell us with refreshing candour that they have no intention of sending us meat for the benevolent purpose of keeping down the price of it in this country, though they may be more favourably inclined to do it with the view of keeping up the price of it in their own—of making farming more profitable. In the 'Agricultural Gazette,' of March 12th in the present year, an American correspondent, who is apparently well versed in the present aspects of the new trade, says:—

> "One consideration may be thrown into the calculation, which is this. The American meat-market has been drooping steadily for some years past, and if it were not that more than 1000 head of the best cattle are shipped weekly, no one knows to what depth the prices here would sink. To get rid of this surplus, therefore, helps greatly to maintain the market rates; and if there is no direct profit there is an indirect gain, which is about the same thing. Just as our cotton manufacturers have sent cloths to Manchester, and have 'slaughtered' them there rather than have had them to weigh down the home markets—or as has been done in other similar ways thousands of times. . . . our dealers have invested large amounts of capital in the business, and, as has been pointed out, may very well feel inclined to sell meat in England at cost, or a small loss even, rather than have their market here imperilled. In the fruit season one may see thousands of cases of strawberries and peaches dumped into the river, to go out with the tide, rather than have them thrown upon the market and demoralise prices. Why might not something of the same character be done in the meat-market if there is money in it? Much more, then, may we look for the cultivation of the export business in meat, if there is but a small profit in it. Depend upon it, if meat is wanted in England, it can be produced here to supply the demand to the fullest extent. It is a question of price—nothing more and nothing less."

The significance of the terms "corner" and "ring," as applied to commercial speculations, is well understood on the other side of the Atlantic, and I fancy I detect a trace of them in the foregoing quotation.

In Government circles the new trade is watched with keen interest. That the Government naturally desires to see the Western States settled and cultivated is beyond the need of argument; but it is felt that unless there be, nearer or farther, a market available for farm-produce, it is futile to expect emigrants to go West in numbers and occupy the land. It is a simple operation to raise fine crops of corn, wheat, oats, or barley on these unoccupied lands; but where is the benefit arising from the crops when they cannot be got profitably to market? Railways are few and far between, and to "haul" the crops to market by horse-power is an undertaking which cannot be entertained for a moment. In the Far West the most profitable use to which the corn could be put when grown, has been, quite recently, to utilise it as fuel—and "splendid fuel" it is said to make. Cattle-raising, however, affords a far better prospect of success than corn-raising, providing only that there be a demand for the cattle; and an outlet for large quantities of fat sheep and cattle is expected to have the effect of inducing many men who understand stock-farming to migrate Westwards and take up land in the unoccupied sections of the country, with a view to feeding the English dressed-meat trade. It is naturally thought that the new trade will have a beneficial effect upon the farming of the Western States. Where the land is at present devoted solely to grain-raising, it is expected the farmers will go to some extent into cattle, which they will fatten on the corn grown on the farm, and thus improve the condition of the land; and in places where farmers have been in the habit of raising cattle which were afterwards fattened in the Eastern States, they will now turn their attention to fattening the animals themselves on home-pastures and on home-grown corn. The best authorities are of opinion that so long as Indian corn can be raised as cheaply as now, the cost of production of cattle will not increase; nor is it expected that the cost of transit will increase much for some time to come, if ever. The great advantage of cattle over corn is that they can convey themselves to market if the distance be not too great, while corn requires "hauling;" this is a consideration which will have great weight with those farmers especially who live some distance from a railroad. I quote the following from a letter by the special reporter of the 'Scotsman,' dated Kansas City, Missouri, May 15:—

"Farmers find it much more profitable to consume their Indian corn by cattle than to drive it to the market and sell it at an average of barely 30 cents per bushel. In fact, several Missouri farmers assured me that they could scarcely make ends meet by selling Indian corn at 28 to 30 cents per bushel, but that by feeding cattle with it they could generally come very near to 50 or 60 cents. And to meet the cost of attending to the cattle, they have the profit they can make from hogs, which is indeed very considerable. Amongst every 100 or 150 cattle, 70 or 100 hogs may be kept and fed entirely from what they gather for themselves, so that whatever can be got for these hogs is clear gain, less of course their cost when they are housed with the cattle. Probably no branch of farming in America pays better than the rearing of hogs. Crosses from Berkshires predominate, and the general stock of hogs is decidedly superior to that of either cattle or sheep. Porkers also seem to be better attended to than the other animals of the farm—or probably it is that they attend better to themselves.

"Within the past few years a large number of improved cattle, with a considerable per-centage of Shorthorn blood, have been introduced into Missouri from the older States, and now the State can boast of more than half-a-score of Shorthorn herds. Several of these herds have no claim to a position in the first rank; but still there are a good many superior 'thorough-breds' in the State. What the Missouri farmers call their native cattle are crosses claiming descent from probably every one of the many different breeds introduced in early days into the New England States. They are of fair size, but are far from what might be desired in regard to quality and shape and fineness of bone. Missouri, however, does not rear nearly all the cattle it requires. It looks to Texas, and, of course, does not look in vain, for probably one-third of the three or four thousand Texan cattle now moving northwards from their native ranges, will find their way into this State before the close of autumn. Here these cattle are fed along with the older native cattle for five months on corn and hay, and sent alive to the Chicago markets in spring, or whenever they may be considered ready for the 'pole-axe.'

"When Texan cattle enter Missouri, they cost from $15 to $23 (3*l.* to 4*l.* 12*s.*) a head; and the finish-off they receive here adds from $20 to $22 more (4*l.* to 4*l.* 8*s.*)—that is, if each animal is allowed (what it usually requires) during these five months about 75 bushels of Indian corn, which in the market would bring from 28 to 30 cents (14*d.* to 15*d.*) a bushel. Native steers of three or four years old, when fat, weigh on an average from 1400 to 1500 lbs. alive, or from 600 to 750 lbs. in the carcass. The Texans, however, fall considerably short of that—probably do not average above 550 to 600 lbs. dead weight."

CONCLUSION.

There seems no ground whatever to assume, although temporary fluctuations in the exports during hot weather have occasionally taken place, that the American dead-meat trade will not rapidly increase, and before long become a very important one. As shown in Table III. (p. 332), the regular trade commenced in October, 1875, with a total for the month of 36,000 lbs., and went on gradually increasing until, for the month of April, 1877, it reached the large total of 8,578,213 lbs., from the two ports of New York and Philadelphia. The monthly totals during the interval represent the American portion of the trade only, but there was also a considerable exportation of both dead meat and live animals from Canada. As the summer came on in the present year, the American exports of dead meat declined in quantity, not because it is difficult to send the meat over the sea in summer-time, but because trade in this country being depressed, the demand fell off, and prices diminished so that the margin of profit left to the exporters caused them to send diminished quantities. The trade must always be subject to these influences, and it will find its level just as other commercial enterprises do; yet I think that the trade, shortly after the commencement, was heralded by a greater flourish of trumpets than there was need for. It remains a fact, however, that the meat can be sent over sea just as successfully, though somewhat less cheaply, in summer as in winter; but on its arrival in this country, the means of continued preservation, and the method of its distribution over the country, have hitherto been so imperfect that the trade has necessarily been attended by serious losses—to the retailer more particularly—and it has been found altogether too risky in hot weather. In time, however, large refrigerating-stores after the manner of that under the Cannon Street Railway Station, will be erected at Liverpool, and in some of our larger cities; and more appropriate vans for conveying the meat by rail will be built. These arrangements complete, the meat will be landed and sent at once to the shore refrigerating-stores, from which it may be distributed over the country as the requirements of the trade may dictate, or it may be safely kept in them for any reasonable length of time.

The ultimate effect of the trade on the price of animal food and on the agriculture of this country is difficult to foresee. It is, however, more than probable that the extravagant expectations of Americans, and of our own public, and the panic caused among our agriculturists, will be found to be without solid foundation. The rapid increase of our population, and the growing tendency towards a larger consumption of animal food per head of that population, will provide a better demand for home-fed beef than our alarmists imagine, however great the trade in Transatlantic beef may eventually become. But, in truth, the trade will never become so great as the vast resources of America and Canada might seem to indicate as possible. In those great countries the means for the production of beef and mutton are indeed well-nigh limitless, but production is not the only great factor to be considered. For some years the out-freights from this country to America, owing to the exorbitant tariffs imposed on our manufactured goods by the American Government, and to the depression of trade in the States, have been gradually declining, until at length the shipping companies have not only been compelled to lay up some of their ships, but are unable to procure remunerative out-cargoes for those still running across the Atlantic. Such being the case, they depend alone on the in-cargoes for payment. Now it will not pay our shipping companies to run more ships than are absolutely necessary, while depending only on a one-way freight; hence it follows that the freight on meat must inevitably advance, unless the export-trade from England to America greatly revives, and of this there is but a remote hope.

With Canada the case is different. The tariff on English goods arriving in Canada is much smaller that that imposed by the United States, and consequently the shipping companies to Quebec and Montreal can obtain paying outfreights to Canada, besides which they are now bringing over large quantities of Canadian cattle, and are making preparations to bring increased numbers, at a freight of 7*l.* per head. Upwards of 300 cattle have already been brought over in one ship, and after a time, as many as 400 or 500 will be brought. In this trade the companies have good profits, whilst the exporters are satisfied with the profits on the cattle sent. These cattle are in summer-time more valuable alive than dead, as they can be held over until they are wanted for slaughter; but in winter-time, so far as I can see, the dead-meat trade will supersede that in fat cattle, whether cold-stores are or are not ultimately built in this country.

It is probable that the American and Canadian meat-trade will stimulate the production of meat in this country if it should lead to the prohibition of the import of live cattle from those foreign countries which are the homes of the contagious diseases that have for so many years seriously interfered with this branch of English farming. When the Corn Laws were abolished, English farmers had still another string to their bow—the production of meat; and as corn-growing became less remunerative, our farmers turned their attention more to breeding and feeding sheep and cattle. By this change of front they were enabled to hold their own, though with increasing difficulty, owing to the importation of cattle-plague, pleuro-pneumonia, and foot-and-mouth disease. But now they are again in danger of being *in extremis*, and this time the remaining string to their bow is to obtain adequate security against the importation of these foreign diseases, coupled with greater freedom in the cultivation of the land and in the disposal of its produce.

My best thanks are due to those gentlemen in the United States and Canada who have supplied me with the valuable information contained in this Report, and also to several gentlemen on this side, notably Mr. Alderman Hubback and Mr. Dyke, of Liverpool, and Mr. Tallerman, of London.

XVI.—*The American Cattle Trade.* By Professor H. E. ALVORD, of Easthampton, Massachusetts.

I WILL endeavour to give a careful and candid presentation of the facts in connection with the production of beef in America, and the present condition and future prospect of the trade in dead meat between the United States and Great Britain.

The general statement that the capacity of this country for the production of beef far exceeds all present needs within our borders, and hence that a demand from outside can soon be met by raising more live-stock, more corn, and accordingly more beef, admits of no dispute. But the details of this production and the condition of the home markets are called for.

As a proper introduction, let us first consider the elements of the article *beef*, namely, the animals, the pasturage, and the grain used for food.

What are known as the "native" cattle of America, have sprung from the stock of the parent countries which successively contributed to the colonisation of the New World, and the types of the original varieties can still be distinguished in some parts of our land. In the older States of the Union, the common stock is a mixture descended from the different kinds of English, Dutch, Swedish, and Danish cattle, brought to the Atlantic shore in the seventeenth century, the English predominating. They have been largely modified by the changes in the climate in which they lived and bred, while the colonists, occupied by their own protection and sustenance, were obliged to let their little herds shift for themselves. The "natives" cannot, therefore, be properly compared with any old or distinct breed, but they are an excellent basis of hardy stock on which to build, and they comprise, with the fast multiplying "grades," the great bulk of the beef and dairy-cattle of the more thickly peopled States. More than eighty years ago the process of improvement began, by the use of imported Shorthorns, and this has continued notably in Virginia, Kentucky, New York, Pennsylvania and Ohio, until the home production of thoroughbred animals is sufficient to furnish the means for the rapid improvement of the whole native stock of the country. There has latterly been a very brisk demand for young bulls, pure bred and high grades, for service in the herds on the Plains.

In the South-West, the Rocky Mountain region, and on the Pacific slope, are found the descendants of the Spanish cattle, introduced into Mexico three hundred and fifty years ago; and these, compensated by a genial climate and luxuriant herbage for want of care, preserve many of their original characteristics.

They are tall, lean, lank, and bony, flat-sided, high in the flank, and often swayed in the back ; heads coarse, with long and wide-spread horns, with a half or full twist to them, and set rather back, with points outward. The colours are black, dark brown, "brindle," reddish-brown, light yellowish-red, and occasionally a grey, nearly all with more or less white upon them. The cows are almost as large as the oxen, and of similar appearance; they furnish the calf but a scanty supply of milk, and that for only twelve or fifteen weeks from birth. They have half-wild natures, impatient under restraint. But this description applies rather to the past than to the future. The "Texans," as they are called, form nearly, if not quite, one-fifth of the whole number of cattle in the country.

So also, in Canada, the rugged little Brittanies of the early French settlers maintain themselves as a distinct race, and serve a most useful purpose within certain limits, but are seldom seen beyond them.

Authorities differ as to the number of neat cattle now in the United States, but a medium estimate for the present year is 29,000,000. This is probably low, as it allows an annual net increase of but 1 per cent. since 1870, being the rate per annum for the decade then ended, which included the war period ; while for the ten years from 1850 to 1860, the increase was from 10 to 25 millions, or almost 40 per cent. These cattle represent a value placed by some at 180 millions sterling; * this being based upon their worth for the ordinary purposes of the dairy and shambles, with no allowance for the fancy prices at which imported and pure bred animals are held, and which are paid for them, as in the famous case of the 8000*l.* cow.

Add the fact that in the United States there are for every 100 persons but 75 cattle, and that these have 5000 acres of land, and some idea may be formed of the *capacity* of this country for the production of animal food.

There are few parts of this country not favourable to cattle raising, although the sections differ, of course, in natural advantages of pasturage, &c. In New England, the Middle States and the northern tier of the Western States, and throughout the North-West, good pasturage abounds in its season, but is available during less than half the year, protection and forage being necessary for six or seven months. In the great central section, especially in the famous blue-grass region of Virginia, Kentucky, Tennessee, parts of the Carolinas and of the Gulf States, the pasturage is particularly fine, and the season is longer by two or three months. Then in the South-West, and on most of the Pacific coast, nature provides luxuriant herbage the greater part of the year, which is self-cured for the remainder, so that the large herds pass the winter without shelter or feeding, and come out in the spring in very fair condition, as a general rule. The only expense of wintering in the great Plains region is a general supervision of the herds, the attention on the part of the herders being necessarily closer the farther north the cattle are kept. Above the 40th parallel careful selection has to be made of suitable spots for wintering; but even in that latitude, west of the Missouri river, the dried grasses of the valleys supply the winter forage without labour or expense.

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* The prices and values stated in this article have been calculated from those originally given in United States currency by Professor Alvord, at the rate of 4*s.* per dollar; and small amounts have been reduced by taking the cent as equal to a halfpenny.—Edit.

For the final fitting of cattle for the shambles, viz., for fattening, maize or Indian corn is chiefly relied upon, and the great corn-producing States are Ohio, Indiana, Illinois, Iowa, Missouri and Kentucky, the last year's crop of the six being over 800 millions of bushels. This, therefore, is naturally the great fattening region of the United States, for both beef and pork. It is manifestly better for the farmers to turn their surplus corn into the more condensed value and bulk of meat at home, than to sell the grain there, or ship it eastward. The expense of sending a car-load of cattle from the Mississippi Valley to the Atlantic coast is just about the same as for an equal weight of corn. But beef-cattle when they reach New York are worth 28*s.* per cental (gross), while 100 lbs. of corn will sell for only 6*s.*

Yet these variations of climate, production of forage, &c., do not affect the distribution of neat cattle in the States as much as might be expected. The ratio of such animals to every 100 inhabitants, for example, is as follows: In New England, from 14 in Massachusetts, to 96 in Vermont (average 47); Pennsylvania, New York, Kentucky, Ohio, Georgia and Missouri, from 38 to 66; in California, Oregon and Texas, 109, 132 and 426, respectively. Ten States have over one million cattle each (three of them over two millions), and ten others over half a million; and these States are situated from the Atlantic to the Pacific, and from the Lakes to the Gulf. In the older States, however, the proportion of milch-cows to oxen and other cattle is very much greater than in the West, showing the predominance of the dairy interest over beef production. Thus New York ranks first in the number of milch-cows (1,350,000), but tenth in other cattle (700,000), the dairy products exceeding the meat-products in value as 3 to 1; Texas, on the contrary, ranks first in number of "other cattle" (3,400,000) and sixth in milch-cows (500,000), and its dairy products are not more than one-sixtieth part of those of New

York. In Pennsylvania and Ohio, the numbers of milch-cows and other cattle are nearly equal.

In all parts of the country will be found farmers who raise more or less beef for market, keeping the animals on their own premises from birth till they leave the stall. But this is not the rule in beef production. In three distinct regions, the conditions to which the farmer is subjected differ essentially. In the Eastern States, especially, and largely in the Middle States, the farmers not only depend upon the grain fields of the West for their corn and "shorts," but find it cheaper to buy their cattle ready-made, at two or three years old, from the more favoured grazing regions, than to raise them at home. This is so generally the case, that calves in these districts are often a drug in the market. Many are knocked on the head immediately after birth, and thousands hurried into veal by all sorts of unnatural processes, to save the milk and cream, which is more valuable than the calf. I have three instances fresh in mind illustrating this fact: one calf was killed and buried immediately after birth; another, of good size and condition to fatten for veal, was sold for its hide for 1*s.* 8*d.* when two days old; and the third, being from an extra butter cow by a thoroughbred sire, the owner disliked to kill it, but sought in vain for a week to give it away, among the farmers of the neighbourhood. The first and last were males, the other a heifer. These are not exceptional cases,—in the dairy districts the people cannot afford to raise their calves even till fit for merchantable veal. But with cattle and grain, both brought from the West, the profit of stall-feeding in this Eastern section is very questionable. The main objects with most farmers are, a home consumption of their hay, and a home production of a good supply of barnyard-manure. If the manure al onecan be gained, the farmer is usually satisfied; but in many cases, of late years, such operations have resulted in manure made at a cost exceeding its value.

In the Central region, among the great corn-fields between the Alleghany Mountains and the Missouri river, grain-food is so cheap and so much exceeds the home demand, that the rule is to raise all increase of the live-stock, and buy largely besides, for fattening, from the fine pastures of the South and West. The profits resulting are manifest from the fact that there is a steady demand at all the chief cattle markets of this region, especially Chicago, for "Stockers," or thrifty animals from two-and-a-half to four years old, in poor flesh, weighing from 600 to 1000 lbs. These are taken into the country, even as far as 150 miles from the place of purchase, and prepared for beef. Steers thus treated often gain 250 lbs. in a season, on grass alone, affording a profit of 3*l.*, and then 200 lbs. more are added by corn-feeding, further increasing the value of the animal by 2*l.* to 2*l.* 10*s.* The Prairie farmers who buy 900-lb. steers at Chicago for 6*l.* 8*s.* to 8*l.*, and sell them there again at 12*l.* to 13*l.* within a year, are generally ready to repeat the operation. The circumstances attending such transactions vary so much, in the nature of the cattle, the prices of grain, freights, and economy of management, that the exact profits cannot be fixed or averaged, but it may be assumed that these operations are decidedly remunerative. Indeed, enough is known from repeated (though disconnected) experiments, to prove that 300 to 500 lbs. can be added to the weight of beef-stock over two years old, in the Prairie States, profitably, at 2*d.* a lb.

In the Western region, beyond the Mississippi and Missouri rivers, the natural supply of forage throughout the year far exceeds any demand made upon it since the buffalo disappeared, and there young animals have their greatest relative value. The only use of the cow there is to produce her calf and sustain it for a few weeks. So, while in New England the average value of a cow is 8*l.* or more, and the calf, at birth, 4*s.*, in Texas the cow is worth 32*s.* to 40*s.*, and the calf from 8*s.* to 12*s.*

Judging from the price obtained and the taste of the markets, one would think that the best beef is that produced in the section where it is raised at the greatest cost. There has been great prejudice in the past against animals fattened on grass alone, and in the North and East nothing has been accepted as first-class beef unless stall-fed. In Baltimore and Philadelphia, however, there can always be found some of the best beef, taken directly from the famous blue-grass pastures of Kentucky and Virginia; and this was true before the revolution wrought in the cattle of that region by the introduction of Shorthorn blood. Until very recently the Texans have been almost excluded from the markets, except as "stockers," or frames on which to build beef by grain-feeding, and even corn-fed Texans have stood at the lowest figures for beef. This has been mainly prejudice, however, and deserves to die out, as it is doing. Late reports speak of Texan beef as "improving in quality *and reputation.*" No one doubts the desirability of improving the Spanish blood by mixture with earlier maturing, better beef-making breeds; but the excellence of the beef of a well-fatted "Texan," which never saw grain, or hay, nor stood under a roof, is undeniable, much as the *looks* of the animal belie the statement. Certainly, in my own experience, I never tasted better beef; and I particularly remember coming upon a little "bunch" of cattle running wild near the northern line of Texas, and shooting a three-year-old bull and heifer of the same age, neither ever touched by a human hand, whose beef was found equally good, and, being submitted to a pretty severe epicurean test, was pronounced unsurpassed.

With these remarks upon the general subject, let me turn more to the details of production, the transportation, the markets and the exportation of American beef and beef-cattle.

Enough has already been said on the subject of production to show that there is little profit in raising beef on the Atlantic slope, and its production there in great quantity is impracticable; that in the Prairie country, east of the Missouri river, there are opportunities for profitably fattening more animals than can be bred; and that in the Plains region, beyond the Mississippi and Missouri, cattle can be reared until two or three years old (of Spanish blood, until four years old), cheaper than anywhere else.

Still keeping in mind the three regions thus described, a little explanation as to transportation may be useful. In the East there are so many country meat markets, and the demand so far exceeds the supply, that beeves are generally sold and butchered within a few miles of the place where fattened. The choicest steers only, such as command extra prices, are taken to the cities; they go by rail, at low freight rates, and the distances being so short, they are delivered without deterioration in weight or quality; they are usually accompanied by the farmer or some local speculator, and disposed of to the city butchers at little expense for commission and handling. But five millions of people in the cities and large towns of the East must receive four-fifths or more of their meat by car transportation, from the grass and grain farms over 1000 miles to the West. Even the smaller towns depend mainly upon Western supplies:—a country butcher in a manufacturing village of 3000 inhabitants in Massachusetts, nearer to the farms of Vermont than the Albany cattle-yards, informs me that during the past two years, not over one-fourth of the beeves he has handled have been fattened in New England, and less than half of those were bred East of the Hudson.

In the Central region the interest centres at Chicago. There is situated the greatest live-stock market in the world, receiving and distributing Western stockers, and receiving and forwarding beef-cattle, besides the trade connected with home consumption and the great meat-packing establishments. Nearly all the business there is carried on at one place, the Union Stock Yards, covering 400 acres, and built in 1865 with a capital of one million dollars. This establishment handled during 1875 over 900,000 neat cattle, 400,000 sheep, and 4,000,000 swine; the total value of this stock being estimated at 23 millions sterling. The cattle of this region, when ready for slaughter, are easily and cheaply delivered at Chicago. The sales there are made by brokers, whose commission is 2*s.* a head for cattle; and the yard fee is 1*s.* each. The animals are forwarded to New York and other points in special cattle trains of slab-sided cars, accompanied by attendants in a "caboose" attached to the train. The load for a car is reckoned at 10 tons, and consists of from 16 to 20 beeves, according to size. They are driven from the yards through chutes, forced into the car, standing side to side across it, and packed closely so as to prevent motion and lying down. The railroad company gives no attention to the cattle except to make necessary stops, and provide yard-room for changes and rests. The men accompanying, one to every twelve or fifteen cars, attend to the feeding and watering, loading and unloading, and with long pikes they periodically *goad up* the cattle which may be down, and straighten out the ranks in the car. On long trips the animals are taken from the cars every 300 or 400 miles of travel, and rest usually a full day and night at each change. In journeys of any length the cattle suffer from the excitement and jolting, rubbing against one another and the car, from want of proper food, water, and rest, from the crowding and confinement, and from brutal treatment in loading and unloading. The shrinkage in weight is serious, from 5 to 10 per cent. for a trip of 1000 miles or more. Such a journey as from Chicago to New York, for example, occupies about five days, including two stops of twenty-four hours each. As to the *manner* of car-transportation of cattle in the United States, it must be pronounced far behind the age, cruel to the animals, injurious to the meat, and detrimental to the owners. As to *cost*, the railway facilities eastward from the Mississippi Valley are more than sufficient, and competition produces low rates: during the past year the total expense of moving beeves of 1200 lbs. from Chicago to New York, when in quantity, has been about 24*s.* per head.

In the Western country most of the cattle have to be driven long distances—from 100 to 600 miles—to reach suitable shipping places on railway lines. From Texas they drive 600 miles northward, to cattle stations in Kansas, the favourite points for shipment there averaging 500 miles from St. Louis, and 700 from Chicago; they also drive eastward, 100 or 200 miles, to railroad stations in Texas, which are 650 miles from St. Louis, and nearly 900 from Chicago. These drives are slowly made —about 10 miles a day. The cattle in large herds may always be driven through good grazing lands, and with proper management the cattle (especially if Texans moving northward) improve *en route*. A gain of a pound a day in weight is quite common in good seasons for a 900-lb. steer, when on the drive two months. The average cost of these drives is about 1*s.* 8*d.* a head per hundred miles. The freight rates from points in Kansas and Texas are rather greater, relatively, than farther North. For Colorado and Wyoming territory, a rapidly growing cattle country, the favourite shipping point is Cheyenne, on the Union Pacific Railroad, 1000 miles west of Chicago. Railway freights are much higher west than east of Chicago, and it costs, for example, to move a bullock from Cheyenne to Chicago, 2*l.*, this covering attendance, feeding, and the terminal charge for placing the animal in the yard; the freight alone is, by contract, for not less than ten carloads, 31*s.* per 1000 lbs. The journeys west of Chicago are harder, trains slower, rests less frequent. Between Colorado or Kansas and Chicago, there are usually but two changes, and sometimes only one. There seems to be less shrinkage in weight of North-Western cattle by car-transportation that in those of the South-West: their flesh appears firmer, and they are graded higher, and command better prices at Chicago. So a steer which would sell at the shipping-point in Texas for 3*l.* 12*s.* to 4*l.*, brings 4*l.* 12*s.* to 5*l.* at Cheyenne, Wyoming. Last December a lot of 1000 lbs. Colorado cattle were bought at Cheyenne at an average cost of a trifle less than 4*l.* 16*s.* a head, brought to New York by contract for 3*l.* 1*s.* each (making 7*l.* 17*s.*), and sold at an estimated dressed weight of 450 lbs. for nearly 4½*d.* per lb., or 8*l.* 2*s.* apiece. There was evidently no spare margin in this transaction, but the animals were ten days *en route*, with but three stops, had a hard passage, and lost over 100 lbs. of flesh each; whereas if they had arrived in good order, they would readily have sold at 2*l.* more per head, affording a handsome profit. And had the same animals been held over in the corn-States until the present time, at a cost of 4*l.* per head (total 11*l.* 16*s.* to 12*l.*), they would now bring in New York 15*l.* to 16*l.* each.

The shipment to England of American dressed beef, which began hardly two years ago, and has since reached such proportions, attracts attention to the effect of this new trade upon home markets, and the provisions for meeting this outside demand. The exports, thus far, have been shipped from Philadelphia, New York, Boston, and Canada; but New York is the centre of the trade, a single dealer having sent out an average of 1000 carcasses a week from that port for weeks in succession during the present year, and it is natural to go to that point for information on the subject.

Twenty years ago, about 150,000 beeves were received at New York during the year, and the average price was 5*d.* per lb. From that the receipts have steadily increased, until they are estimated for the present year at about half a million, with the prices, gold basis, standing just about as they did in 1856. There has been, however, a considerable fluctuation in the prices during these years, and other facts worthy of note. In 1860 the receipts were 227,000, and the average price for the year only 4*d.* per lb. At that time New York State ranked first in the sources of supply for this market. In 1865 the receipts were 273,000, and the price, under war pressure, reached the highest figure ever known, 8*d.** During the early part of that year (1865), cattle were sold in New York at 13½*d.* per lb., estimated dressed weight, and the United States Government bought immense quantities of beef under contract at 1*s.* Later the same year the contract price fell to 8*d.* The source of supply had so changed by this time, that half the total receipts were credited to Illinois and States farther West, New York being next in order. In 1868 New York State still held the second place, and Texas contributed 10,000 beeves. In 1870 the receipts were 356,000, and the average price declined to 7*d.*, and New York became the fifth in source of supply, Texas furnishing twice as many as the home State. In 1874 the price had fallen to 6*d.*; and of 451,000 cattle received, Illinois was credited with supplying one-half, Texas 75,000, and even the far-distant Colorado became the rival of New York, each giving about 13,000. In 1875 and 1876 respectively, the receipts were 453,000 and 470,000, and the average price 5½*d.* and 4¾*d.* per lb. During the first half of 1877, the receipts of beeves were reported at 246,000, and the average price had advanced to 41*s.* 9½*d.* per 100 lbs.

It must be understood that in the New York market beef-cattle are sold at their estimated dressed weight, the merchantable beef only being from 56 to 58 per cent. (in some cases 59 per cent.) of their live-weight. A steer whose live-weight is 1000 pounds, is reckoned to weigh only 560 lbs., but the buyer gets the whole animal. The prices above quoted are in United States currency, and the relative value of the paper dollar and the gold dollar at the different dates must not be overlooked —in 1865 when beef sold for 12½*d.* per lb., this meant 6*d.*, or less, in gold. Excluding the period affected by the war, the general average price of dressed beef in the New York market has been from 4½*d.* to 5½*d.* per lb., gold, for twenty years, and has ranged between those limits for the last eighteen months, standing at 5⅜*d.*, gold, the first week in July. The steady growth of the market, and the marked change in the sources of supply, are the most striking features of the figures above given, especially showing the increasing movement of cattle Eastward. The great proportion of the receipts at New York credited to the State of Illinois, simply means that they are forwarded from the Chicago market, and thus invites attention to that point.

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* These prices and those immediately following, which are calculated from the United States paper currency, are subject to certain deductions, as explained by Professor Alvord further on, to bring them to the true value of our money.—Edit.

At Chicago the cattle sold in 1855 numbered but 10,000; in 1860, 156,000; 1862, 209,000; not yet equalling the New York market. But in 1865, 333,000 cattle were received, and from that time Chicago has led, and the growth has been very rapid. In 1870 the receipts were 533,000; in 1875, 920,000; and last year a round 1,000,000. As this is mainly a distributing market, three-fourths of all cattle received being reshipped alive, all sales are by gross live-weight, and are made, as a rule, at the Union Stockyards by brokers whose regular commission is 2*s.* a head. The prices correspond naturally to those of New York, with due allowance for transportation, shrinkage, and profits, so they need not be given here. The greater range in the prices at Chicago—as, for example, last year from 1*d.* to 3½*d.* per lb.—is accounted for by the fact previously mentioned, that it covers not only transactions in the best beef, all ready for the shambles, but thousands of "stockers" which are sold to be kept on the prairie pastures and among the cornfields of Illinois and neighbouring States for from six months to a year, or more, before being forwarded to Eastern markets. The same animals in large numbers thus pass through the Chicago market twice. The sources of supply at this point present the same features as at New York. Up to 1865, the receipts were almost entirely from the great agricultural States, of which Chicago is the commercial centre. Texan cattle had begun to find their way to this market through Missouri in 1859–60, but the war then interrupted this movement. In 1867, however, 37,000 Texans were reported as received at Chicago, and 55,000 in 1868; besides these there were other thousands, originally Texan stock, but fattened in intermediate States, and credited to them upon arrival. In 1870 the arrivals from the Far West began to be very large; Texas, Kansas, Nebraska, Colorado, and Wyoming furnishing the greatest proportion of the total receipts, and this continues to be the case.

In Texas, Kansas, Colorado, and Wyoming territory, cattle are sold without weighing, and with but a general reference to their weight. They may be quoted as follows:—At the "ranches" in Texas, yearlings, 16*s.*; two-year-olds, 24*s.*; three-year-olds and cows, 36*s.*; beef-cattle, 2*l.* 8*s.* to 3*l.* In Kansas, on the railroad, yearlings, 24*s.*; two-year-olds, 32*s.*; three-year-olds and cows, 48*s.*; and beeves, mainly four-year-olds, 850 to 1000 lbs. gross, 3*l.* to 3*l.* 12*s.* At railroad stations in Texas a shade lower. In Colorado and Wyoming there has been more demand for cows and young cattle for stocking new ranches, causing higher prices for such animals; two-year-olds, 2*l.* 8*s.*; cows, 3*l.*; but merchantable beeves, 9 to 10 cwt., have ranged from 3*l.* 12*s.* to 5*l.*

Quotations might be given from the market reports of various other places—St. Louis, Cincinnati, Buffalo and Albany, Baltimore, Philadelphia and Boston; these seven cities received from 100,000 to 500,000 cattle each during 1876, an aggregate of over 2,000,000. But no new facts would be developed by extended comparison; the prices, &c., would be seen to correspond with those of Chicago and New York. While local depressions and sudden advances might be observed—for such occur,—the close connection between these several markets makes it impossible for material differences to exist any length of time which cannot be accounted for by geographical position, cost of transportation and the like.

These facts as to the chief markets in the grazing districts, the feeding and distributing region, and the places of consumption and exportation, enable certain deductions to be made as to the present and prospective beef interest in America.

Eastern consumers and the exporters must continue to depend for their main supply upon the great corn-States, represented by the Chicago market; and as the demand upon that region for fat cattle will continue to exceed the natural increase of their own herds, they in turn must look to the Far West and South-West for most of their young animals or "stockers." What is called the *Prairie* country, east of the Missouri, must be stocked largely from the *Plains* region, west of that river. The farmers in all parts of the country, who raise comparatively few animals from the calf, must compete with these larger supplies, and their prices will be controlled accordingly. It is evident, therefore, that the *cost* of producing a two or three-year-old bullock on grass alone, in the vast pasture which used to be called the great American desert, will largely determine the price of cattle in Chicago. Add the corn-crop (maize) and its value in the Mississippi basin, and we have the two chief factors governing the price of beef on the Atlantic slope, and, it may be, in Great Britain also.

Let us now follow an animal in its course from its native pasture to the port of New York, or to Liverpool. We will start with the supposition that in the chief grazing district of Texas a steer, ready to start to market in the spring at four years old, is worth 3*l.* 12*s.* This is for a first-class animal of its kind, of better form and beef-quality than the ordinary run of the old Spanish Longhorns (perhaps sired by a grade Durham), and weighing 1000 lbs. Starting in March as one of a large herd, with good grass springing up all along the path, this animal may reach the railroad at Wichita, Kansas, during the month of May, weighing 1050 lbs. or more. Allowing 12*s.* to cover the cost of the drive and all expenses, including a probable change of ownership, the value of the animal on leaving the Kansas shipping station will be four guineas. Thirty-two shillings more will place it in the Chicago yards, weighing not much less than at its start, or, making generous allowance, let us say 960 lbs., and that sum will also cover the expenses of sale there. He will be rated as a "stocker" now, and sold for 1¾*d.* per lb. gross, or thereabouts, bringing 6*l.* 16*s.* to 7*l.*, or a profit of 20 per cent. at this point. Let him be sold at Chicago for 7*l.*, and taken to an Illinois pasture or corn-crib; he will return to market in the autumn, fatted mainly on grass, weighing 1150 lbs., and will sell for 10*l.*—a handsome profit on the operation, especially when, as is often done in that State, from 100 to 1000 head of cattle are handled together in this way. Or let him rather be taken from Chicago, June 1st, at 7*l.*, and returned the following winter at 1275 lbs., and sold then at about 2½*d.* per lb. gross, bringing 12*l.* 16*s.* We will call 2*l.* 16*s.* of this increased value the profits of fattening, being over 25 per cent. on what the animal cost its seller. Our bullock may now be taken to New York for 24*s.*, and reach that city within a year after leaving Texas, weighing rather over 1200 lbs., and costing its owner then, as above, 14*l.* Sold now on the New York system, at 5½*d.* per lb., reckoned 56 per cent. dressed beef, there will be a profit of 16*s.* to 20*s.* on the animal as it passes to the *abattoir.* The profits of slaughtering and wholesaling the beef are well known. The butcher, who buys the live animal at about 15*l.*, reckoned at 5½*d.* per lb. dressed weight, can well afford to sell the carcass to the wholesale dealer at 5*d.* per lb., for the hide, tallow and offal will pay all the expenses of handling and dressing in New York, and yield large gains besides. And there is still room for the jobber to make handsome profits before the beef is cut up and retailed.

The retail prices obtained for meats have little influence upon the business, and need not enter into a general consideration of this subject. The dealers in our local markets, as a recent writer has remarked, "seem to have a grip on their customers, and squeeze them persistently, unmercifully, and unreasonably, especially in our Eastern cities." The retail meat-markets maintain no proper relation in prices to the wholesale; witness the fact that while during the last three years the average price, wholesale, per pound, has ranged from 6*d.* down to 4¼*d.* per lb., and up to 5¾*d.* again, for beef of the same quality at the same market, there has, during this period, been no perceptible change in retail prices. It is often remarked that the butchers and retail dealers in our cities and large towns are the most prosperous of the business men, and amass fortunes rapidly.

The foregoing sketch shows eight different owners, besides three brokers, who each sell the animal or its beef at a profit before it reaches the consumer in New York. The figures given accord with the facts as to steers of the kind described, during the average seasons of several years past, although higher all the way along than quoted for 1876. Yet it will be noticed that the profits are very large at all points. The drover who bought of the "ranche-men," and sold in Kansas, made the least, proportionately, about 8 per cent. for four months' time and capital; but this driving and sale is as likely to be done by the stock-raisers themselves, or their employés, as by a middle-man as above supposed. The dealer who bought in Kansas and sold in Chicago, made 1*l.*, or more, being nearly 20 per cent. on a transaction which might be repeated monthly, at least. The prairie farmer's profits for feeding, which were reckoned at 56*s.*, or 25 per cent. on the capital, occupied a year, practically. The shipper from Chicago to New York shall be taken at the lowest estimate, 16*s.* profit, being 6 per cent., and he, constantly engaged in this business, can "turn" his capital in this way twenty times a year. (I stop at this point, without tracing the profits in slaughtering and selling, because it is in the yards that the exporters buy, and this subject will be considered with ultimate reference to their trade.) Here are aggregate profits of 4*l.* 16*s.*, or one-third of the 14*l.* 16*s.* at which the animal was sold at the New York yards.

Just so much as the profits of these middle-men can be curtailed, and the expenses of transportation economised, can the selling price of the bullock be reduced in New York. Leaving freights at the rates cited, but reducing the several items of profit enumerated about one-half (which is plainly possible), it is evident that such beeves *can be* placed in New York at 12*l.*, instead of 14*l.* 16*s.*, and still allow ample gains to all concerned. This makes it possible for such beef to be sold in New York at 4½*d.* per lb. instead of 5½*d.*, as supposed in the case taken. And, in fact, the average price of this grade in that market during the last nine months has been 5*d.* per lb., although, as late as July 15th, it was 5⅝*d.* per lb.

But this still supposes that the steer necessarily cost 72*s.* on its Texan range, whereas it is certain that bullocks of 1000 lbs.

weight can be raised on the Plains between the 95th meridian and the Rocky Mountains, and delivered at the shipping points, at lower prices than they now command.

A full description of cattle-raising in Texas and Colorado would prove this conclusively. But it is too long a story to insert here, and so much has been written upon the subject of late, that it is becoming quite familiar to all interested. I will only refer to some letters published in the London 'Spectator' in March, 1877, as giving a graphic account of "Cattle Herding in the Great West," and add a few examples of the profits of the business.

In 1858, an ordinary farmer in Tennessee, who had toiled there for some years and gained nothing but a living, moved to the central part of Texas, his possessions then being 60 cows, 10 horses, and other effects, worth in all not over 500*l.* He engaged in stock-raising at his new location, applied all his gains to the increase of his business, made no special hits, and his estate at the time of his death, two years ago, consisted of 50,000 acres of land and as many cattle, with other property, representing a total value of 120,000*l.*

In 1872 five men made up a capital of 10,000*l.*, cash, and, buying cheap lands in Texas, began stock-raising. They now own 250,000 acres, largely fenced; they have purchased over 100,000*l.* worth of stock cattle since they began, and have sold 126,000*l.* worth; their present property is estimated at 170,000*l.* clear, and thus is shown a profit of almost 200,000*l.* in five years.

Eight years ago a young fellow went out to Colorado with about 400*l.* borrowed money. He bought stock cattle, beginning in a modest way; has "roughed it," attending to his business in person, with Mexican herders to help; and he now owns 8000 head of cattle, is free from debt, is worth 20,000*l.*, and his sales this year will amount to 6000*l.* Last year he sold four-year-olds weighing 1000 lbs., delivered on the railroad in Wyoming, for 5*l.* a head, which was rather above the average of the market. Next year he expects to sell three-year-olds, heavier and better, the first-fruits of a purchase of Shorthorn bulls, which he is now using exclusively, as a matter of demonstrated economy as well as improvement.

Two of these may be exceptional cases, the last is not so. Numerous others could be given, with more or less variation of details, but the same general results. Twenty-five per cent. per annum upon the invested capital is the profit *depended upon* in this business. Manifestly, with such a state of things, the beef stock these herders send eastward can be sold at the shipping points at two-thirds the prevailing prices, and still yield a satisfactory return. In further support of this statement, reference may be made to the prices paid by the United States Government for beef bought by contract in large quantities for the subsistence of the army and of the Indians on the Plains. In 1869 large purchases were made at 1¾*d.*, dressed, or 3*l.* 10*s.* a head for steers of 1000 lbs., delivered in the Indian territory, 200 miles from the Texas ranges. (I inspected many of these cattle myself, and know they were good beeves of their kind.) In 1872, at the same point, a little more (3·68 cents per lb., dressed) was paid for 6,000,000 lbs.; in 1874, 1⅜*d.* per lb.; in 1876, 1⅞*d.* Here is an average of 3*l.* 12*s.* for four-year-olds of 1000 lbs., which covered driving, risks in an Indian country, and the *large* profits always secured by the Government contractors on our frontier. The average price received for these animals by the ranche-men who raised them was probably 2*l.* 16*s.* Likewise in Wyoming territory during the last three years, contractors have sold the United States 25,000,000 lbs. of dressed beef, when the animals had to be driven 200 miles north of Cheyenne, at an average price of 2⅝*d.* per lb., which is about 5*l.* 4*s.* a head for bullocks of 1000 lbs. The stock-raisers of Colorado and Wyoming could have sold them more profitably at the railroad for 4*l.* 4*s.* each, had there been a demand; although this is 15 per cent. below the market rates of that vicinity.

It is undoubtedly true that the Eastern markets will not remain satisfied with the grade of beef which these extreme Western herds have produced. But already an improvement is perceptible. The New York reports for June state: "Texans, which, by the by, are rapidly improving in quality and reputation, brought 5½*d.* and 5¾*d.* per lb., 56 per cent. of beef." This improvement is certainly to be expected, and a little experience will assure its progress. The breeders find that by using pure-bred Shorthorn bulls, the first cross with the Texan stock produces animals which are better prepared for market, in size and condition, at two and three-years-old, than the natives a year or more older. The saving of time and freeing of capital thus secured, more than counterbalance the objections to the necessary outlay, and will ultimately cheapen the production as much as it helps the quality of the beef.

It is therefore safe to assert that *it is possible* for beeves weighing 1200 to 1300 lbs., such as now sell in New York for 15*l.* to 17*l.*, to be placed there at a cost of from 10*l.* to 11*l.*, and still be profitable to all who handle them. That being so, beef can be sold in our Eastern markets at 3¾*d.* per lb., of the same grade as is now quoted at 5½*d.*

The next point is to connect these beef-sales in New York with the subject of exportation. The animal I have described and "figured on" will not furnish as high a grade of beef as is demanded in New York by the exporters; but its carcass will take the place in the New York market of one which is exported. While the Northern-wintered and corn-fed Texan steer sells at 5½*d.* per lb., the choicest bullocks, such as are selected by the exporters, are quoted at 6¼*d.* per lb. for the extreme. This relation is sure to be maintained, and as the price of the Western beef stands or declines, so must that of the highest grade accord with it, whether the animals be from the prairies of Illinois, the blue-grass of Kentucky, or the stalls of New York and Vermont. This cannot be otherwise: first, because the difference in quality of the two grades of beef is not now such as to command a greater difference in price; and secondly, because the quality of the lower grade is certain to improve henceforth until it will fairly rival the higher. This difference in price between choice steers of high-bred stock from Eastern and corn-growing farms, and the improved Western beeves, is therefore more likely in the future to decrease than to increase.

But as to the exportation of dressed beef. This trade is, undoubtedly, established, and although it may fluctuate, it will not cease. New men and more capital are reinforcing it, and the many drawbacks and obstacles in the business are more likely to be overcome than to overcome it. Mr. Eastman, one of the earliest and largest exporters—to whom I am indebted for many courtesies in reference to this matter—has invested about 25,000*l.* in thirty refrigerating compartments in different vessels, with accompanying machinery, chill-rooms at the slaughter-houses, &c.; and other parties in New York are largely interested, as well as operators at Boston, Philadelphia, and Baltimore. Canada is also contributing to the trade, as well as sending over live cattle. Portland, Maine, seems to be a favourite point for shipments of Canadian beef, 12,000 quarters having been sent to England from that port during the first four months of this year. It is estimated that over 50,000 carcasses have been sent out from other ports of the United States during the first half of this year, Mr. Eastman alone having shipped an average of 1000 beeves a week. This, against 20,000 animals exported for the whole of last year, shows the growth of this business, and all upon rising prices. The average price paid by exporters at the yards for nine months past is thus stated:—5⅜*d.*, 5¼*d.*, 5½*d.*, 5⅝*d.*, and 5⅞*d.*, 6*d.*, 6⅛*d.*, 6⅛*d.*, 6¼*d.* per lb. This steady advance is accounted for by the fact that, during the period covered, the supply of first-class beeves has not equalled the demand. Previous to the opening of this new trade, our home-markets showed a surplus; but the exportations have increased, thus far, faster than it was possible to increase the product. No such difficulty is apprehended in the future, however, and no further advance in prices.

Referring to previous figures, we see that there is a large profit to most of those concerned in raising, feeding, and marketing cattle in this country, when the best beef sells alive in New York at 6¼*d.* per lb. estimated dressed weight. This is, as above, the highest price reached for the best during the past nine months, the average being 5¾*d.* *So, if the exporter can afford to make shipments when paying* 6¼*d., he is safe enough.* The men who export, buy their beeves at the yards, have their own slaughter-houses, dress, pack, and ship, and remain the owners of the meat when sold by the cargo on the other side. The animals thus purchased, if in New York, weigh about 1400 lbs., dress 58 per cent. of this, about 800 lbs., and cost, say, 20*l.* But the buyer gets the "fifth quarter;" and as this is worth in New York about 3*l.* for such an animal, he is able to slaughter, pack, and ship the four quarters, and be satisfied if they *then* yield him 18*l.*, or 5⅝*d.* per lb., for what he purchased nominally at 6¼*d.* And this 5⅝*d.*, at which the beef stands when ready to *leave* New York, means United States currency, or 5⅜*d.* in gold. The cost of ocean-transit is 1⅛*d.* per lb., gold, at the outside, making the lb. of American beef represent to its owner, when landed at Liverpool or Glasgow, practically, 6½*d.* This, being of the best quality, brings the highest price; and if sold for 4*s.* 4*d.* per stone of 8 lbs., it covers all costs, and the exporter makes his profit, as shown, in the handling at New York. This profit I place at 4 per cent. upon the total capital employed, and the nature of the transaction makes it probable that one constantly in the business will repeat it at least ten times a year with the same capital. But, as before stated, the highest rates prevailing at any time during several months past are those which have been taken in considering the cost to the exporter, while the *average price* which the exporter has received for *good* beef during the same period at Liverpool is understood to be at least 4*s.* per stone. *Most* of the shipments during the last six or eight months have reached the other side at such a cost to the exporter, that all he could obtain over 5½*d.* a lb. per carcass was *surplus*, or profit over and above what he considered as covering the rise and risk of his capital.

The details of the method of ocean transit of dressed meat, and the itemised cost of the same, are omitted, because the one has been fully described and illustrated in numerous publications during the present year, and the other varies with the circumstances attending each shipment, and the efficiency of the manager. Various improvements and means of economising—the results of experience—have already reduced the total cost between shipment and delivery from 1½*d.* to 1⅛*d.* per lb. average, and it is confidently expected that a further reduction will be effected.

While the exporters of American dressed meats depend for their profits and the permanence of the business upon the ruling prices on the two sides of the ocean, the fact of the trade must itself influence those prices. When the margin between them becomes too small, the shipments may be suspended, and a surplus in the Eastern markets of this country will soon carry prices down to a point which will reopen the trade. The extent of the trade must even now, though perhaps imperceptibly, reduce to some extent the prices of English beef at its great markets. I have noticed that, at periods during the last fifteen months, when the prices of English beef at the Metropolitan Meat Market have been lowest, the reports have in each case noted the presence of an unusually large supply of good American beef. Remove the American competition entirely, and prices in England will probably soon warrant new consignments. The trade already has a double action.

It is true, undoubtedly, that the selection of choice animals by the exporters, and the amount of their shipments, have caused of late a scarcity in the higher grade of beef in the home markets, and, indeed, the general demand has somewhat exceeded the supply; hence the advance in prices here. This can have but one effect—an increased production and lower rates. It has been shown that both are quite feasible, accompanied, too, by a steady improvement in the average quality of the beef marketed. It is not probable that any considerable decline will be realised; for if the foreign demand is such that increased shipments will meet with ready sales at anything like the prevailing prices of American beef in England during the last year, the exportation of our entire surplus will tend to hold up the prices here; but it is the *possibility* of the future, as well as the present fact, that we are considering. Should a sudden decline of prices occur in the cattle-trade, it would cripple holders who had bought at higher rates; but the general result reached by this extended review of the subject is, that it is possible to effect a gradual reduction in the cost of production and handling at all points, without embarrassment to any concerned, or such lessening of profits as will diminish the supply, until beef fully equal in quality to the best now exported can be started from Atlantic ports in any quantity that is demanded, at a cost to the owners of 3¾*d.*, and delivered in Great Britain at a cost of 4½*d.* per lb., gold basis.

In conclusion, therefore, I believe that American beef will be profitably sold before long, in Liverpool and Glasgow, at 4½*d.*

per lb. (3*s.* per stone) by the carcass; that the supply at this price can be brought to meet demands not yet thought of; and that the quality will, in time, be such as to satisfy the most discriminating British market.

Postscript.—In reading over this Paper, two or three matters are called to my mind, which, unless at least mentioned, might be regarded as serious omissions.

1st. Canada has been mentioned only incidentally. There has been no intention to disregard the cattle interest of that great region, but it has ample opportunity of making itself known to British readers, and I deemed it best to confine myself to territory of which I had personal knowledge.

2nd. Similarly, very little has been said of most of the Southern States, although several of them have been specially mentioned. The great agricultural industry of the South has, in years past, been turned towards tobacco, cotton, and sugar, as specialities; and cattle husbandry has held a minor position. That region, as a whole, has done little more than supply itself with beef, and, indeed, some parts have bought largely from the West. But a change is taking place; less attention is being paid to specialities, and a wider range in agriculture is being taken. The facilities for cattle production in Virginia, Tennessee, the Carolinas, and the Gulf States, are such, that that region is almost certain to make itself felt in our live-stock markets, in the event of a considerably increased demand.

3rd. This Paper has been intentionally confined to *beef* production. The raising of sheep and swine, and the home markets for mutton and pork, as well as their exportation, could not well be considered at the same time.

4th. The exportation of neat cattle alive has been given no attention, because I believe that this trade cannot grow in the future in comparison with the exportation of dead meats, but that, on the contrary, the former must ultimately give way to the latter.

5th. A problem, much more interesting than the shipment of live cattle to England, is the possibility of moving the slaughtering-places for the dressed beef exported to places farther West, avoiding railroad transit of live-stock. It is almost too early to discuss this intelligently, but it cannot be long before means will be devised for supplying our Eastern markets, and probably, too, the wants of the exporters, with beef dressed in the Mississippi Valley, if not at a still greater distance.

XVII.—*Village Clubs.* By Sir E. C. KERRISON, Bart.

AT the present time we hear much of the increase of intemperance amongst the labouring classes, and of various plans by which this great evil may be diminished. Some are for multiplying public-houses indefinitely, others for lessening their number, and a few for the purchase of all such houses by the ratepayers, so as more thoroughly to control them.

Whilst these different political economists are settling the course which the House of Commons should pursue, we may consider whether we have no means at hand which may in some degree lessen the evil of which every one complains. In towns much has been done to ameliorate the condition of the people in this respect, by providing Public Libraries and Mechanics' Institutes with their lectures and other attractions. Workmen's Halls have been erected, and many employers of labour have reading-rooms attached to their works. These special places of meeting for the working classes are further supplemented by billiard-rooms, theatres, music-halls, and other places of amusement, where drink is not the sole object. But in country villages hitherto little has been done to counteract the evils of the beer-house. From every pulpit, at some time in the year, the labourers are warned against spending their money in drink; but where is the male portion of the population to go during the winter months, except to the public-house, if there is no reading-room—no room with a fire in it? It is easy to preach morality, but difficult to practise it, unless some more useful way of spending an evening is at the same time pointed out. Is it reasonable to ask a large family of grown-up young people, or a man with a house full of small children, to remain in their cottages, and not, after a hard day's labour, have some amusement?

Those who think that a man should be content to remain in his cottage and go nowhere else, are the only people who can be found to object to Village Clubs. We are raising the standard of education daily. Do we desire that, after the elementary school, education should cease, and young men be left entirely without the means of turning their education to some profitable purpose?

It is true that many well-intentioned people have failed to make a Village Club successful. Reading-rooms have been built, and few have attended; but that was before the labouring population themselves felt the great necessity for education.

Experience in several villages has proved that there is beginning to be a great desire amongst the labourers in rural districts to read newspapers, and to borrow books. Hitherto the efforts of people willing to assist in promoting Village Clubs have been rather desultory; and, failing to obtain any general support toward buying new books, giving lectures, or otherwise infusing some spirit into their management, they have lacked the necessary stimulus to make them popular. An attempt has been made in Suffolk to rectify this state of things, which there is every reason to believe will slowly spread over other counties in England. In 1875 the Suffolk County Village Club Association was founded with the following objects:—

1. To assist existing clubs and reading-rooms, and to aid in the formation of new institutions of the kind throughout the county.
2. To supply members thereof with the rules of successful clubs.
3. To facilitate the exchange of books.
4. To provide, as far as possible, for lectures on questions of general interest, neither political nor theological.
5. To give information on the subject of provident societies, savings-banks, and other kindred institutions.
6. To assist in any plan clearly shown to this Association to afford to the labouring population of the towns and villages of the county increased facilities for intellectual and social recreation.

This County Society has so far been successful that it has been in communication with some fifty clubs in Suffolk, has started eighteen clubs, and been the means of assisting a great many others, and of supplying information to most of the counties in England, to Ireland, and even to America, besides obtaining for the use of the clubs books to the value of 100*l*. And this has been done with a very small outlay—very little fuss or public notoriety—quietly and unobtrusively, as all such useful works should be done, gradually by their real worth finding favour amongst the people.

No central society can for a moment pretend entirely to work local institutions like Village Clubs; but it may give good counsel, suggest rules, lend books, and provide lecturers and magic lanterns. Such work has already been done in Suffolk.

By changing books much expense is spared, and to those unacquainted with the working of Village Clubs, lists of books which the labourers will read are supplied. There are few villages in which a room cannot be hired, and some subscriptions obtained to buy books, and provide the necessary lights and fire. Smoking is generally allowed, and it is a question whether beer in small quantities may not be brought into the reading-room; but at first there is no need to supply refreshments; a few games without gambling, together with newspapers, prove a sufficient attraction.

Some clubs in parishes with 500 or 600 population begin with 30 or 40 members, others with 20; but in small villages nearly all close during the summer-months, when allotments claim the attention of the men, or (where, unfortunately, no allotments are to be obtained) out-door games and amusements take the place of the reading-room, and afford general and wholesome recreation. These games are encouraged by the members of the reading-rooms, and thus an interest in them is kept up throughout the year.

This county organization to assist Village Clubs, now for the first time called into existence in Suffolk, has for many years been thought necessary in towns, although in the large towns there is much less difficulty in forming clubs of all kinds, and keeping them up, than in rural districts. For forty years the Yorkshire Union of Mechanics' Institutes, with its annual conference, has flourished. There are some 202 clubs attached to it, and 37,600 members are now represented in that *one* union.

There is very little doubt that these County Clubs will increase; and then most useful discussions or conferences may be held at no distant period in the different counties of England. We are very apt in this country to wait a long time for changes in our laws, and not to take advantage of the means at our disposal to diminish the evils we see around us. Village Clubs alone cannot deal with intemperance, but they can remove the temptations to excessive drinking by supplying places of recreation where drink is not the special object. Education, carried out as it will be in a few years in all our rural parishes, to be a real blessing to the people, must be properly directed. The thirst for knowledge amongst the labouring population is daily on the increase; and it is a duty incumbent on the more educated classes to supply the materials necessary to guide that knowledge into the most useful channels.

Good secretaries are essential to work the machinery of a central society. Suffolk is fortunate in that respect. Lord John Hervey and Mr. Robert Johnson of Boyton, who was the first person to call attention to the necessity for a Central Society, act as Honorary Secretaries. Either of these gentlemen, or Mr. Waters, the Secretary, living at Ipswich, will give information to those who are *really* desirous of extending the area of County Clubs.

Temperance cannot be assured, or education thoroughly promoted, by such clubs unless the full and entire sympathy of the labouring classes be enlisted. They should principally manage their own clubs, and be only guided by the counsel of men who can bring practical experience to their assistance.

The poet says:—

> "'Tis to thy rules, O Temperance, that we owe
> All pleasures that from health or strength can flow;
> Vigour of body, purity of mind,
> Unclouded reason, sentiment refined."

Every village with a population, at any rate, of 200 should have its reading-room; and if by so small an effort the minds and bodies of the residents in rural districts can be refined and improved, the work of educational and temperance reform will be lessened at a very small cost of money, and of labour.

Oakley Park, Scole.

XVIII.—*The Suffolk County Medical Club.* By Sir E. C. KERRISON, Bart.

THE object of this Club is to enable benefit members to provide themselves and their families with medical attendance and medicine during sickness. Benefit clubs provide medical attendance for men only, but it is well known that women and children are more liable to illness than men. This club is intended to remedy this omission, and not in any way to interfere with established benefit societies.

The first stepping-stone to pauperism is an application for the doctor. It is now not so often granted by Boards of Guardians as it used to be, but when it is granted, in nine cases out of ten, meat and porter or wine are ordered by the medical man, and the rates are burthened not only with the ordinary maintenance of the families, but with the extras which the doctor considers right to order, and thus one family after another become paupers.

It is not to be wondered at that an honest labouring man should seek to obtain the services of a doctor free of cost, when his wages will not enable him to pay a doctor's bill. It can only be by numbers collected together in a club of this description, that the charges made by medical men can be brought within the means of the people. Every man or woman, whose earnings do not exceed twenty shillings per week, or any maid-servant, whose wages do not exceed 8*l.* a year, can become a member.

The rules of this club will give to any man or woman an opportunity of choosing any doctor who has joined the club, and who resides within a certain specified distance, for the sum of five shillings a year. The rates of payment for a man and his wife are nine shillings, and for each child (up to five children) one shilling each; no further charge being made when the number of children exceeds five. A member of any other benefit club may claim an exemption of four shillings from the above sum. Women in their confinements are attended for ten shillings; the remaining fees payable to a medical man being supplemented by the honorary fund.

It is not an unusual thing for operations or fractures to cost from three to five guineas, a sum which no poor man is able to pay. By belonging to this club, such payments will be avoided, and a man can look with certainty to the fact, that however large his family, all ordinary doctor's expenses (except for confinements) will never exceed fourteen shillings a year.

In one year and a-half, about 4000 members have joined the Eye Medical Club, almost without solicitation, the working classes having at once perceived the advantages which a club of this description holds out to them; and the County Medical Club proposes to extend its operation beyond the limits of the Eye Club, to the whole county.

Most of the principal doctors in the county have consented to the terms, now for the first time embodied in the rules certified by the Registrar; but the Medical Club by its rules cannot proceed to the appointment of a committee to carry its provisions out until a certain number of members have joined to elect that committee.

According to one rule, stewards must be chosen in each parish to receive the payments of members willing to join; and in every district comprising one or two unions, there may be a secretary appointed to communicate with the stewards and with the central society at Ipswich.

In order that the working-classes in the various parishes may understand the objects of this Medical Club, it will be necessary at once that small meetings should be held to explain the rules; and that stewards be appointed who will act voluntarily, and be willing to receive the payments of members.

When a committee has been selected, which it has been proposed to appoint at the next public meeting at Bury St. Edmund's, more direct rules for the guidance of stewards will be issued, the names of the medical men willing to join the club will be printed, and the society will be put in working order.

The club will be self-supporting, except in three particulars, viz:—the management fund, the accident fund, and extra payments to the medical men for confinements.

Any person bestowing a donation of 5*l.*, or paying half-a-crown a year, becomes an honorary member. It is therefore of consequence that not only benefit members should be enrolled as speedily as possibly, but that honorary members should signify their willingness to assist in this undertaking, which must commend itself to every one who desires to see the rates diminished, pauperism decreased, and independence encouraged.

Copies of the rules have been sent to every medical man in the county, and twelve copies to every Board of Guardians. The provisional committee do not feel justified in going to further expense for the present.

From the experience of the Eye Club, it is certain that when once the club is started, the desire of the working class to belong to it will spread from parish to parish so rapidly, that every one willing to assist should at once be prepared with the information required by intending members.

RULES.

I. This Club is called the Suffolk County Medical Club. Its registered office is in England, and is at 24, Clarkson Street, Ipswich, in the county of Suffolk. In the event of any change of the situation of the Registered office, notice of such change shall be sent within 14 days thereafter to the Registrar, in manner and form provided by the Treasury Regulation in that behalf; Friendly Societies Act, 1875, s. 14 (1 a.).

II. *Object.*—The object of this club is to enable the benefit members * to provide themselves and their families with medical attendance and medicine during sickness.

III. *Constitution.*—The club shall consist of honorary and benefit members, comprised in such districts as may from time to time be established.

IV. Honorary members shall be those who contribute not less than five pounds as a donation, or than two shillings and sixpence per annum, to the honorary fund, and shall be entitled to one vote.

Benefit members shall be those whose weekly earnings do not exceed twenty shillings, or if domestic servants, receive not more than eight pounds a year.

V. *Management.*—The business of the club shall be managed by a Committee called the Committee of Management, which shall consist of the following officers: a President, Vice-President, three Trustees, all of whom shall be honorary members, three of the medical men attached to the club, and four other members.

Three shall be a quorum.

Vacancies shall be filled up at each annual meeting.

A copy of every resolution appointing a trustee shall be sent to the Registrar within fourteen days after the date of the meeting at which such trustee was appointed in the form prescribed by the Treasury Regulation in that behalf.

The other officers of the club shall be a treasurer, three auditors, any two of them shall be competent to act, a secretary, a district secretary, and a steward or stewards of each parish or place.

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* N.B.—Wherever the term "member" is used, it shall apply to both males and females.

No member who is a minor shall be capable of holding office on any committee, or of filling any office excepting that of steward.

VI. The committee of management shall meet at the office of the Society, not less than once a quarter, viz.:—on the fourth Tuesday in February, May, August and November.

They shall examine, with power to disallow, the proposals for admission of members, which may be transmitted to them by the stewards.

They shall direct the payment of all sums due to the medical men.

They shall examine the books and accounts of the club, and decide upon complaints made to them through the stewards.

They shall take into consideration any matter affecting the welfare of the club.

VII. The president shall preside at all meetings of the club, of the committee of management, and at every special meeting, and shall have a casting vote, in addition to his own.

The vice-president, in the president's absence, shall preside with like powers.

A chairman in the absence of both president and vice-president, to be elected by the meeting, shall preside with similar powers.

VIII. *Meetings.*—An annual general meeting of the members shall be held on the fourth Tuesday in May, at which every member, both honorary and benefit, shall have one vote.

At this meeting the members shall elect the committee of management for the ensuing year, fill up vacancies among the auditors, and take into consideration any other matter affecting the interests of the club.

The committee of management shall appoint all other officers of the club.

Any officer or member of the committee may be removed at an annual general meeting.

The president, on a requisition signed by twenty members, shall summon a special general meeting of the club.

A special meeting of the committee of management may be called by the president, the vice-president, or by any three members thereof, by giving fourteen clear days' notice in writing to the secretary.

At such meetings no business shall be transacted except that specified in the notice.

Notice of such special meeting must be given by circular at least seven clear days before.

At all special meetings of the committee of management six shall form a quorum, and of a general meeting twelve.

IX. In case of a failure to elect any one or more of the officers named in Rule V., the persons who shall have hitherto served in the offices respectively for which no election shall have taken place, shall continue to serve.

X. In all cases the vote of the majority of members (whether benefit or honorary) present and voting at a general or special meeting shall determine the question under discussion.

XI. *Officers.*—The treasurer shall be responsible for such sums as may from time to time be placed in his hands on account of the club. He shall balance his cash account quarterly, and supply the secretary with a duplicate thereof. Before taking upon himself the execution of his office, he shall give security, pursuant to the Friendly Societies Act, 1875, s. 20 (1).

XII. The secretary, whose salary shall be fixed by the committee of management, shall transact all business of the club under its direction. He shall give his attendance at all meetings of the club, shall record correctly the names of the members of the committee of management then present, and the minutes of their proceedings. He shall keep the accounts, documents, and papers of the club, and shall prepare all returns and other documents required by the Friendly Societies Act, 1875, or the Treasury Regutions, to be sent to the Registrar.

XIII. The steward or stewards of each parish or place shall admit members (Rule 22) subject to approval by the committee of management, receive the contributions of the members, enter the same on the members' cards, keep the books and accounts prescribed by the committee of management, and furnish the district secretary with a quarterly statement of his receipts within one month of the first day of January, April, July, and October, and in all matters act under the direction of the committee of management. He may be paid such yearly salary as the committee of management shall direct.

The district secretary shall, for his district, keep the books and accounts prescribed by the committee of management, and furnish the secretary with a quarterly statement of his receipts within one month of the first day of February, May, August, and November, and in all matters act under the direction of the committee of management. He may be paid such yearly salary as the committee of management shall direct.

XIV. The committee of management shall have the power to dismiss or to accept the resignation of any officer.

XV. *Funds.*—So much of the funds of the club as may not be wanted for immediate use, shall, with the consent of the committee of management, be invested by the trustees in a savings' bank, or in the public funds, with the Commissioners for the Reduction of the National Debt, upon Government or real securities in Great Britain or Ireland, or upon debentures, debenture stocks, mortgages, or securities of any company incorporated by charter or Act of Parliament and paying a dividend, or upon the security of any county, borough, or other rates authorised to be levied and mortgaged by Act of Parliament, in the purchase of land, or in the erection or alteration of offices or other buildings thereon.—Friendly Societies Act, 1875, s. 16 (1).

XVI. Mortgages or other assurances for securing money to the club may be vacated by a receipt endorsed, signed by the trustees, and counter-signed by the Secretary in the form contained in the 3rd Schedule to the Friendly Societies Act, 1875.—Friendly Societies Act, 1875, s. 16 (7).

XVII. The honorary fund shall consist of one-third of the moneys received from honorary members, provided that if at any time this fund shall be insufficient to meet the necessary charges thereon, the committee of management shall, at a meeting duly called for that purpose, direct that from each benefit member there be levied a sum, not exceeding one penny per quarter, or fourpence per year, which shall be applied exclusively to the payments chargeable to this fund, and of which contributions a separate account shall be kept, to be balanced and audited annually with the other accounts of the club.

XVIII. The management fund shall consist of two-thirds of the moneys received from honorary members, together with all fines from benefit members, and all sums otherwise unapplied, including interest on all sums temporarily or otherwise invested.

Provided that if at any time this fund shall be insufficient to meet the necessary expenses of management, the committee of management shall, at a meeting duly called for that purpose, direct that from each benefit member there be levied a sum not exceeding threepence per quarter, or one shilling per year, to be applied exclusively to the necessary expenses of management, of which contributions a separate account shall be kept to be balanced and audited annually with the other accounts of this club.

XIX. *Accounts.*—All moneys received on account of contributions, subscriptions, fines, or otherwise, shall be applied towards carrying out the objects of the club, together with the necessary expenses of management, according to the rules thereof.

XX. All moneys received or paid on account of every particular fund, or benefit assured by the club, for which a separate table of contributions is adopted, shall be entered into a separate debtor and creditor account, distinct from all moneys received and paid on account of any other benefit or fund.

XXI. A separate account shall also be kept of the expenses of management of the club, and of all contributions on account thereof.

XXII. *Admission of Members.*—Any person wishing to become a benefit member shall not be under sixteen years of age. He shall deliver to a steward of his parish or place a certificate of health according to the printed form issued for the purpose by the club, which must be signed by the medical officer under whose care he desires to place himself. No person shall be admitted a member if any one of his family, for whom he contributes, shall be actually suffering from illness, except by permission of the medical man under whose care he desires to place himself.

XXIII. Each benefit member shall contribute for his wife and for all his children under sixteen years of age who are living at home, provided that any orphan children living with the member, and of whom he is the guardian, may be included therewith.

XXIV. A benefit member shall be entitled to select any of the medical men who have attached themselves to the club, subject to the approval of the medical man, as shown by his signature to the form of application for admission. He shall not be allowed to change his medical attendant except at the end of each year, of which one month's previous notice must have been given to his steward.

XXV. A benefit member shall not be entitled to attendance in sickness for himself or any of his family until he has been a member one full calendar month.

XXVI. The quarterly contribution of a member shall be due on the first Monday in January, April, July, and October; and shall be paid to his steward at the place and time appointed.

XXVII. *Fines.*—Any benefit member not paying his contribution within fourteen days after it becomes due shall cease to be a member, but may renew his membership by paying a fine of half-a-year's subscription, in addition to the full quarter's subscription.

Any member making a false statement as to the number or ages of his children, or entering any of them when to his knowledge they are in ill health, shall be expelled the club and forfeit all claim upon it.

XXVIII. *Contributions and Payments.*—The rates of contributions by benefit members shall be according to the following scale, and shall be paid by equal quarterly instalment in advance.

Man or single woman, 5*s.* per annum, or 1*s.* 3*d.* per quarter.
Man and wife 9*s.* „ or 2*s.* 3*d.* „
Each child under 16 years of age, 1*s.*, or 3*d.* „
N.B. Not more than 5 *children to be paid for in one family.*

Any benefit member, who has been a member of the club for six months, shall be entitled to medical attendance for his wife in confinement, by paying to his steward the sum of ten shillings, and taking the club's printed form of order to the medical man, at least a month beforehand.

XXIX. Any man who is also a member of a benefit society, which provides him with medical attendance, shall be allowed a reduction from his rate of contribution of four shillings per annum.

XXX. The medical men attached to the club shall be remunerated according to the following scale.—

For man or single woman,	5s. per annum,	or 1s. 3d.	per quarter.
For man and wife	9s. „	or 2s. 3d.	„
For each child in a family,	1s. „	or 3d.	„

Not more than 5 children in a family being paid for.

Provided that such payments shall not include remuneration for such injuries and surgical operations as are excluded from the salary of a district medical officer, under the consolidated orders of the Local Government Board, nor for attendance on confinements, nor for extraction of teeth.

If the man be also a member of a benefit society, which provides him with medical attendance, these payments shall be reduced by four shillings per annum.

XXXI. The medical men attached to the club shall be entitled to the following fees:—

	£	s.	d.
For each midwifery case within one mile of such medical man's residence	£0	15	0
For each midwifery case beyond one mile from such medical man's residence	1	0	0

By midwifery cases shall be understood confinements at full terms, and premature confinements in which the sixth month of pregnancy has been completed.

For surgical cases the medical officers of the club shall be remunerated at the same rate as district medical officers under the consolidated orders of the Local Government Board. All other cases shall be included in the ordinary medical attendance, and shall not entitle medical men to extra fees.

XXXII. The extra payments for confinements and for surgical cases under Rule XXXI. shall be defrayed from the honorary fund.

XXXIII. Each medical man shall frame regulations as to the hours, &c., at which members requiring medical advice, shall apply to him, and acquaint his steward or stewards with the same.

Each benefit member shall be supplied with a printed copy of such regulations, which shall be observed by him, except in cases of special urgency.

XXXIV. Bottles and trusses shall be found by the members.

XXXV. Members suffering from delirium tremens, venereal diseases, or from any injury received whilst under the influence of intoxicating liquors, or while confined in any prison or lunatic asylum, shall not be entitled to receive any benefit from the club.

XXXVI. Any member who removes his residence to a place more than four miles distant from the residence of the medical officer attending him shall not be entitled to any of the benefits of this club, unless there shall be residing within four miles of the member's then residence a medical man on this club's list; in which case, on giving notice to the steward, he shall be entitled to attendance and medicine from such medical man.

XXXVII. All complaints of whatsoever kind shall be made in writing to a steward of a parish or place, who shall investigate it, and failing to settle the same, transmit it with his report thereon to the secretary, who shall lay the same before the committee of management.

XXXVIII. *Keeping and Auditing of Accounts.*—The committee of management shall cause the accounts of the club to be regularly entered in proper books.

XXXIX. The committee of management shall, once at least in every year, submit such accounts, together with a general statement of the same, and all necessary vouchers up to the 31st of December then last, for audit, to two or more persons appointed as auditors by the members, at the meeting next before each yearly meeting of the club, and shall lay before every such meeting a balance-sheet (which either may or may not be identical with the annual return, but must not be in contradiction of the same), showing the receipts and expenditure, funds, and effects of the club; together with a statement of the affairs of the club since their last ordinary meeting, and of their then condition. Such auditors shall have access to all the books and accounts of the club, and shall examine every balance-sheet, and annual return of the receipts and expenditure, funds, and effects of the club; and shall verify the same with the accounts and vouchers relating thereto, and shall either sign the same as found by them to be correct, duly vouched, and in accordance with law; or, shall specially report to the meeting of the club before which the same is laid, in what respects they find it incorrect, unvouched, or not in accordance with law.—Friendly Societies Act, 1875, s. 14 (b. c.).

XL. *Annual Returns.*—Every year, before the 1st of June, the committee of management shall cause the secretary to send to the Registrar the annual return, in the form prescribed by the Chief Registrar of Friendly Societies, required by the Friendly Societies Act, 1875, of the receipts and expenditure, funds, and effects of the club, and of the number of members of the same, up to the 31st of December then last inclusively, as audited and laid before a general meeting, showing separately the expenditure in respect of the several objects of the club, together with a copy of the auditors' report, if any.

XLI. Such return shall state whether the audit has been conducted by a public auditor appointed under the Friendly Societies Act, 1875, and by whom; and if such audit has been conducted by any persons other than a public auditor, shall state the name, address, and calling or profession of each of such persons, and the manner in which and the authority under which they were respectively appointed.—Friendly Societies Act, 1875, s. 14 (1 d.).

XLII. It shall be the duty of the committee of management to provide the secretary with a sufficient number of copies of the annual return or other document allowed by 39 and 40 Vict., c. 32, for supplying gratuitously every member or persons interested in the funds of the club, on his application, with a copy of the last annual return of the club for the time being, or such other document; and it shall be the duty of the secretary to supply such gratuitous copies on application, according to Friendly Societies Act, 1875, s. 14 (1 W.).

XLIII. *Quinquennial Returns.*—Within six calendar months after the expiration of every five years succeeding the 31st of December, 1875, the committee of management shall cause a return, in the form prescribed by the Chief Registrar, of the sickness and mortality experienced by the society during the last five years preceding the 31st of December then last past, to be sent by the secretary to the Registrar.—Friendly Societies Act, 1875, s. 14 (1 e.).

XLIV. *Valuations.*—Once at least in the five years next following the registry of this club, and, so again within six calendar months after the expiration of every five years succeeding the date of the first valuation, to be made under these rules, the assets and liabilities of the club (including the estimated risks and contributions) shall be valued in manner provided by the Friendly Societies Act, 1875, s. 14 (1 f.), unless the same shall have been dispensed with by the Chief Registrar with consent of the Treasury.

XLV. If a valuer is appointed by the club, it shall be his duty, at the cost of the club, to make a report to be signed by him, and which shall also state his address and calling or profession, on the condition of the club, and also an abstract of the result of his valuation, in the form prescribed by the Chief Registrar.

XLVI. On receiving such report it shall be the duty of the committee of management to call forthwith a special meeting of the club for the purpose of receiving the same, and to lay such report and the abstract thereof before such meeting; to cause the secretary to forward such report and abstract to the Registrar within the six months aforesaid, together with a return containing such information with respect to the benefits assured and contributions receivable by the club, and to its funds and effects, debts, and credits, as the Registrar may from time to time require.

XLVII. *Inspection of Books.*—Every person having an interest in the funds of the club, shall be at liberty at any reasonable time to inspect the books of the club, and it shall be the duty of the secretary to produce them for such inspection.

XLVIII. It shall be the duty of the committee of management to keep a copy of the last annual balance-sheet of the club for the time being, together with the report of the auditors, if any, and of the last quinquennial valuation for the time being, always hung up in a conspicuous place at the registered office of the club.—Friendly Societies Act, 1875, s. 14 (1 i.).

XLIX. *Dissolution.*—The club may at any time be dissolved by the consent of five-sixths in value of the members, including honorary members, if any, testified by their signatures to some instrument of dissolution in the form provided by the regulations in that behalf, and also by the written consent of any person for the time being receiving or entitled to receive any relief, annuity, or other benefit from the funds of the club, unless the claim of such person be duly satisfied, or adequate provision made for satisfying such claim; the value of members to be ascertained by giving one vote to every member, and an additional vote for every five years he has been a member, but to no one member more than five votes in the whole.—Friendly Societies Act, 1875, s. 25 (1, 3, 7).

L. *Investigation of Affairs.*—It shall be the right of one-fifth of the total number of members, or if the number of members shall at any time amount to 1000 and not exceed 10,000, it shall be the right of 100 members; or if the number shall at any time exceed 10,000, it shall be the right of 500 members, by an application in writing to the Chief Registrar, signed by them in the forms respectively provided by the Treasury Regulations in that behalf:—

(*a.*) To apply for the appointment of one or more inspectors to examine into the affairs of the club, and to report thereon.—Friendly Societies Act, 1875, s. 23 (1).

(*b.*) To apply for the calling of a special meeting of the society.—Friendly Societies Act, 1875, s. 23 (2).

Either such application to be made upon such notice to the club, and to be supported by such evidence for the purpose of showing that the applicants have good reason for requiring such inspection to be made, or meeting to be called, and that they are not actuated by malicious motives in their application as the Chief Registrar shall direct.

(*c.*) Or to apply for any investigation into the affairs of the club, with a view to the dissolution thereof; such application, as last aforesaid, to set forth that the funds of the club are insufficient to meet the existing claims thereon, or that the rates of contributions levied in the rules of such club are insufficient to cover the benefits assured, and the grounds upon which such insufficiency is alleged.—Friendly Societies Act, 1875, s. 25 (8).

LI. It shall be the duty of the committee of management to provide the secretary with a sufficient number of copies of the rules, to enable him to deliver to any person on demand a copy of such rules, on payment of a sum not exceeding one shilling, and of the secretary to deliver such copies accordingly.—Friendly Societies Act, 1875, s. 13 (5).

LII. No new rule shall be made, nor any of the rules herein contained or hereafter to be made shall be amended, altered, or rescinded, unless with the consent of the majority of the members present at a general meeting of the club specially called for that purpose.

ACKNOWLEDGMENT OF REGISTRY OF SOCIETY.

The "Suffolk County Medical Club" is registered as a Friendly Society under the Friendly Societies' Act, 1875, *this 7th day of July,* 1877.

Registry of Friendly Societies' Central Office.

J. M. Q.

Copy kept, J. M. Q.

XIX.—*The Rothamsted Allotment Club.* By J. BENNET LAWES, F.R.S.

TWENTY years ago it occurred to me that a Club-house in connection with the allotment-gardens established by me in the parish in which I reside might add to the comfort and enjoyment of the labourers. My idea of a club-house at that time was a building having a large room, where the members could have their beer and tobacco, and a smaller room to be used as a library. I also thought that this room might be employed as a store, upon principles similar to those which had been established with so much success at Rochdale and other places. It was, of course, not of much use to consult any one as to the probability of such an undertaking being successful. One or two, to whom I mentioned the subject, shook their heads, and suggested the exclusion of tobacco, and stringent regulations respecting the allowance of beer. The idea of one or two hundred men assembling night after night in one place was by no means approved of, and it was thought that such an arrangement would not be conducive either to the peace or the sobriety of the community in general. I thought, however, the experiment was worth trying, and that if it failed, the building could be turned into a cottage, with very little trouble or expense.

I accordingly gave a plan to a builder, and a few months afterwards the club-house was ready for occupation. It had one lofty room, with a sky-light and two side-windows; a good fire-place and stove, to get abundance of warmth in winter, and a thatched roof to be cool in summer. There was also a smaller room, not connected internally with the large room, and a roofed verandah, going all round the building, provided with seats for summer occupation. I then ordered in a barrel or two of beer, and put up a notice that I should be glad if every owner of an allotment garden would meet me there on a certain evening. I need not say that curiosity and the attraction of the beer did not leave many absentees. I then told them the use I proposed to make of the building; that every one holding a garden could be a member of the club; that I would manage it for them for one year, selling them beer, subject to a few simple rules, after which they must elect their own committee of management, and form their own rules. I said that I had been advised to restrict them in the use of beer, but that I should not do this, merely observing that if the place got a bad name for drunkenness, the disgrace would extend to me as well as to themselves. I then left them to discuss the matter over their beer, and for the rest of the year rarely, if ever, went near the place.

Labouring men are rather apt to imagine that if any one does them a kindness, his motives are not altogether disinterested. If they had thought one of my objects was to know more about their ideas and acts; if, in fact, they had fancied that they did not possess entire freedom of action, they would not have abandoned the public-house for the club. At the end of the year a dinner took place, and, by universal suffrage, twelve committee-men from amongst the members were elected to manage the club, and make rules for the ensuing year. At first some little jealousy existed between the agricultural labourers and the owners of gardens, who were somewhat above them in social position, and as the day labourers were necessarily in a large majority, the committee were entirely composed of that class. The result of this was mismanagement, and, generally, a clean sweep of the whole of the committee men at the end of the year. The day labourer is somewhat of a politician, and is fond of making laws, so that at one time the club was rather over-loaded with rules. But, having made these laws, he is by no means anxious to enforce them, and on one or two occasions I had to point out how important it was that the rules should be strictly enforced. In the course of time the jealousy referred to passed off, for it was found that the man whose social or pecuniary position was somewhat above that of the agricultural labourer possessed more intelligence than he, and was better able to conduct the affairs of the club. After this, instead of a complete change of ministry, the elections would pass off with comparatively small changes; the present chairman, to whom, more than to any one else, the success of the club is due, having held this post for about seventeen years. From time to time the rules have been altered, as circumstances required: those now in force will be found at the end of this article. Shortly after the club was established, the late Mr. Austin, with whom I was associated on a commission "to inquire into the sewage of towns," requested permission to bring down his brother-in-law, Mr. Charles Dickens, to see the club. This visit is described in an article entitled 'The Poor Man and his Beer,' published in the first number of 'All the Year Round,' April, 1859.

It may be mentioned here, that neither the reading-room nor the store club proved of any use, education being at a very low ebb in Harpenden twenty years ago. The club-books were therefore transferred to a general parish library. At the present time, however, the reports of her Majesty's Inspectors show a very high state of efficiency in the education of this parish. It need hardly be said that a club-house receiving barrels of beer direct from the brewer did not meet the approval of the publicans, or that an attempt was made to compel me to take out a licence. When I first established the club, I pointed out clearly to the members that any attempt to sell beer to non-members would destroy the private character of the building; and, to the best of my knowledge, no attempt of the kind has been made. At all events, I was successful in establishing the character of the club before the magistrates. It will probably be asked, What are the benefits which the parish has derived from this club, and what inducements it holds out to others who contemplate the establishment of a somewhat similar institution? As a substitute for the public-house, it possesses many advantages. A man can hardly go into a public-house, and occupy a seat for the evening without also drinking beer there, for the publican must be paid in some way for providing fire and candles; whereas at the club no one is expected to drink, each member acting entirely in accordance with his own inclination. In villages where there are several public-houses, it is well known that each has its regular customers, and some houses have a bad reputation with the police; petty thefts, and even worse crimes, being often developed where small parties of men are frequently meeting. In a club of any size (Rothamsted has about 180 members) such things are impossible. Those who consider all public-houses an evil, and all drinking of alcohol in any form, and in whatever moderation, an unmitigated curse, are not likely to give any encouragement to an institution which has for one of its main objects the supply of beer to its members. As, however, we cannot prevent drinking, it appears to me desirable that we should endeavour to lessen and arrest some of the evils attendant upon it. If any one will picture to himself the limited accommodation of a labourer's cottage on a winter's evening, with one small fire entirely surrounded by his wife and children, he will hardly blame the man who seeks warmth, quiet, and the society of his fellow-labourers elsewhere. Some attempt made by me to substitute coffee for beer was not successful. It is true the men drank it, and pronounced it very good, as long as I supplied it gratis, but they could not be persuaded to purchase it as a substitute for their beloved beer. To become a member of the club, it is necessary to possess an allotment-garden, the ordinary size of which is one-eighth of an acre, and the rent five shillings per annum, although some allotments are only half that size. I occasionally give prizes for the best cultivated gardens, and every second year we have a show of vegetables. The men take immense interest in these gardens, and should the Royal Agricultural Society offer a premium for the best set of allotment gardens, we should stand a very fair chance of carrying off the prize.

At the Annual Dinner, which takes place the first Saturday in June, I have an opportunity of meeting almost all the members of the club, and of discussing subjects of mutual interest; even the delicate one of "strikes" has not been avoided, and a discussion on the subject, bearing upon the relation between the employers of labour and the labourers, has not in any way altered the friendly feeling between them. The influence of the club upon the moral and religious condition of the members can hardly be discussed in these pages. I think, however, any one who reads over the rules of the club, and considers that they have been formed by a committee elected by the annual vote of every member of the club, and that they are not merely printed rules, but are rigidly enforced, must acknowledge that the members submitting to these rules must have arrived at a position considerably in advance of that generally accorded to the agricultural labourer in this country.

Rules and Regulations of the Rothamsted Allotment Club.

1. Every one elected as a member shall pay one shilling entrance fee; he shall sign his name to the rules, and shall pay one halfpenny weekly to the club, and threepence on the death of any member or his wife.

2. Any person wishing to take an allotment garden, can have his name written on a board, to be hung up in the club-room, in the following form:— A. B. proposed by C. D., member.

3. When a vacancy occurs in an allotment garden, the names of the candidates shall be taken in the order they are written on the board, and they shall be voted on at a meeting of the committee.

4. The club shall be managed by a committee of twelve members, who shall hold office for one year; they shall have power to make rules, and the whole management of the club shall be in their hands.

5. The annual meeting of the club shall take place in the month of June,

on which occasion the committee for the succeeding year shall be elected. The members of the committee may be re-elected, but it shall be competent for any member of the club to nominate any other member to serve on the committee. The election to be decided by a majority of votes.

6. Each member to draw the beer in order, according to the number of his allotment; on failing to do so, a forfeit of one penny to be paid to the club.

7. The member who draws the beer shall be in attendance at the club-room every week-day at six o'clock: if he is not there at a quarter-past six, he shall be fined threepence; if he does not attend at all he shall be fined sixpence. He is to remain until ten o'clock, but in the event of no member being present at nine o'clock, he may shut up the room at that hour.

8. The member whose turn it is to draw the beer shall receive from the previous member the oath book, sixteen shillings and sixpence, and half a barrel of beer, and shall deliver over these articles to the succeeding member. He shall also pay over to the brewer the sum of sixteen shillings and sixpence, and order half a barrel of beer. Any neglect of this rule shall make him liable to a penalty of five shillings, for which sum he shall be sued in the County Court, as well as for any deficiency in the amount of money entrusted to him.

9. Any member selling beer shall be expelled from the club.

10. Any member giving beer to any one except to his wife and children, or to his brother and sister, will be fined one shilling.

11. Any member drawing beer on a Sunday morning shall be liable to a penalty of one shilling, to be paid to the club.

12. Any member drawing beer after ten o'clock, except on a quarter night, when half an hour longer will be allowed, shall be liable to a penalty of sixpence, to be paid to the club.

13. Any member making, or causing others to make, any disturbance or row in the club-room, will be fined threepence.

14. Any member swearing, or repeating an oath in the club-room, or under the verandah outside the door, shall be liable to a penalty of twopence each time, to be paid to the club.

15. Any member getting vegetables in the garden-fields after nine o'clock on a Sunday morning, by Rothamsted time, will be fined sixpence.

16. Any member not paying his money before ten o'clock on the quarter night will be fined threepence; if not paid within one month from that date, he will cease to become a member of the club, and will forfeit his garden; he can then only enter the club by a fresh election and the payment of a fine of one shilling.

17. Any member not keeping his allotment-garden clear from seed-weeds, or otherwise injuring his neighbours, may be turned out of his garden by the votes of two-thirds of the committee, after receiving proper notice.

18. Any member wishing to give up his allotment, must give notice to the committee, and the succeeding tenant can enter on any part of the allotment which is uncropped at the time of notice of the leaving tenant.

19. The committee shall meet four times every year for transacting the business of the club, namely, on the first Monday in January, the first Monday in April, the first Monday in July, and the first Monday in October, from seven to eight o'clock in the evening. Any member not attending, except in the event of illness, shall pay threepence to the funds; and no

member shall allow his name to be put down to serve on the committee unless he is in a position to attend, and take an interest in the same.

20. As soon as possible after the death of a member of the club, the sum of 2*l.* shall be paid out of the funds of the club to the widow, or widower, or if the member is not married, to the nearest relation.

21. Any member drawing or giving beer to those who are expelled from the club, shall be fined threepence.

22. No member shall be entitled to the money paid at death until he has paid up all his subscriptions and fines for twelve months.

23. Any member breaking a mug, is to pay the cost of replacing the same.

24. Rents for the gardens are due on the 29th of September; if not paid within one month of that date, the members who have not paid will forfeit their allotments, and will be proceeded against by the committee for the amount due in the County Court. If paid between the 29th of September and the 29th of October, a fine of sixpence will have to be paid.

25. Any member or members belonging to this society found fighting, or striking in the room or in the field, will be liable to a penalty of five shillings for each offence, to be paid to the club.

26. The books of this society shall be examined every half-year, and a full statement made of the income and expenditure of the society at a general meeting, and a full report shall be presented to the members at the annual meeting of the members in June.

27. Any member taking tools from another man's garden without leave, and not returning them the same day, will be fined one shilling.

28. Any member laying dung on the gravel roads, will be fined one shilling for the first offence, and for the second offence he will be expelled from the club.

29. Any member who sells the produce of his garden to a stranger, must be present himself—or some of his family must be present, or he must give notice to the man who attends to the walks to be present—when the produce is cut or removed. If the purchaser removes the produce without a witness, the owner of the garden will be fined one shilling.

30. When a member has drawn his barrel of beer, he must show himself in the club-room, and ask for the next member to take his place, or be fined one shilling; but if no one is there to take it, he can tap a second barrel.

31. Any member making a dispute about any of the rules, it shall be settled by the committee, and their decision shall be final.

INCOME and EXPENDITURE of the ROTHAMPSTED ALLOTMENT CLUB, from March 1876, to March 1877, submitted to the MEMBERS at the ANNUAL MEETING, June 2, 1877.

INCOME.	£	s.	d.	EXPENDITURE.	£	s.	d.
Balance per last Report	59	4	3½	Feast Bills	19	4	9½
Paid by Members towards Feast	6	8	0	Coals and Wood	2	1	9
Subscription and Fines, 1st Quarter	9	11	11	Gas, Rent of Metre	4	3	1
Ditto 2nd ”	9	5	8	Matches, Candles, Blacklead, cleaning Stove-pipes, &c.	1	13	8
Ditto 3rd ”	6	6	7	24 New Japan Pint Pots	0	17	0
Ditto 4th ”	6	9	10	New Contribution Book	0	2	6
Entry money	0	11	0	Payment on Deaths	6	0	0
Interest for cash in Bank	2	14	6	Book-keeping	2	0	0
					36	2	9½
				Balance	64	9	0
				Total	£100	11	9½
				Of the above there is in Bank, held by Mr. Lawes	62	14	6
	£100	11	9½	In Secretaries' hands	1	14	6

For many years the item "for oaths" figured in the income side of the balance-sheet. I am glad to say that this source of income has disappeared.—J. B. L.

XX.—*The Prize System as applied to Small Farmers in Ireland.*

By Professor BALDWIN.

IN most parts of Ireland the agricultural practices of the small farmers are very defective. In some places they they are quite primitive. Vast numbers of the occupiers are very poor, while wide areas of land are not yielding a fourth of the produce which could be obtained from them.

While many large farmers and graziers partake of the general progress of the kingdom, little or no improvement has been effected in the condition of vast numbers of the occupiers of the small holdings.

The increase in the price of store stock and of butter has enabled many of them to pay their way much better than they used to do, but in their dwellings and social condition there has not been a corresponding improvement. In the more backward districts they have not been influenced by the action of Agricultural Societies. Thousands upon thousands of them have never seen a cattle-show; and as a class they have come to the conclusion that cattle-shows are rather inimical to their interests. It is wholly unnecessary to discuss this view. It is sufficient for my present purpose to state that every person conversant with the state of Ireland knows that the feeling has prevailed and retarded the progress of the country. Even if this feeling did not prevail, it must be borne in mind that the action of the existing Agricultural Societies could not reach down to the small farmers in remote districts where cattle-shows are never held.

Lord Spencer, K.G., while Lord-Lieutenant of Ireland, saw all this, and sought some means of creating among this class a taste for progress. The scheme he adopted, and the result of which I shall set forth in this paper, aims at creating among the small farmers of a limited district a spirit of emulation. Lord Spencer found in the department with which I am connected a ready-formed machinery for carrying out his views. The readers of this Journal are aware that there are in Ireland a great many small agricultural schools; that is, National Schools to which school-farms are attached. Lord Spencer made eight of these schools, two in each province, the centres of eight districts, in each of which he gave prizes for the best managed small farms. My colleagues and I have been the judges. In each district the agricultural teacher has been the local agent or secretary. The competition has been limited to farms which did not exceed 8*l.* valuation; and, subject to this one condition, every small farm within five miles of the agricultural school, or centre, was eligible to compete.

The adjudication has been made according to the following scale of marks:—

	Marks.
1. For the cultivation of the land, including the system of cropping, the productiveness of the crops, and condition of the land, a maximum of	300
2. For the live-stock, taking into account the quality of the animals, their suitability to the farm, and the number maintained	100
3. For the farm-offices, embracing the plan, the construction, and state of repair	50
4. For home-made manure, taking into account the position of the site of the manure heap as regards the dwelling, &c., the mode of collecting and preserving it, and the quantity made	50
5. For the cottage-garden	50
6. For the dwelling	50
Total	600

This, like every scale of the kind, is artificial. On the whole it has answered very well. Throughout the entire competition, which has lasted for five years, not a single objection has been made to the awards. Whenever and wherever it was possible to do so, the competitors were called together in the school-room after the inspection, the marks given to each in the several sections were read to them, and the good and bad features in their modes of management pointed out. In this way a spirit of inquiry and rivalry has been engendered, the advantages of which it is impossible to describe.

A few additional words of explanation appear to be desirable before I state the results of Lord Spencer's experiment. Englishmen and Scotchmen who have been accustomed to large farms cannot realise the condition of the small farmers in many parts of Ireland. In England the average size of the holdings may be said to be about 200 acres; in Ireland it is about 30. In round numbers, the total number of holdings in Ireland is about 600,000; of two-thirds of which (or 400,000) not one is above 30 acres. In England the farmhouses are, as a rule, good. The dwellings of a vast number of small farmers in Ireland are wretched. In this age of progress it is unsatisfactory to find that there are in Ireland very many small farmers with large families whose dwellings consist of one apartment, in which cattle and pigs are housed. I have seen more than once the manure pit in the middle of the apartment ! ! !

In order that the reader may realise the field for improvement in many parts of Ireland, I recapitulate some of the defects in the agricultural practices of the country.

There are four millions of acres of medium land now growing poor herbage, which often contains more weeds than grass, and which would pay far better in tillage. At present the gross return from those four millions of acres does not amount to twice the rent; if put under a proper system, the yield would amount to five times the rent, and the wealth of the country would be increased to the extent of several millions sterling a year, which would be available for distribution among labourers, farmers, manure- and seed-merchants, and shopkeepers of all kinds. In due time, too, the landlords would obtain an increase of rent, for it is a law of agricultural progress that anything which increases the farmers' profits tends to advance the rent of the land.

Besides the four million acres of pasture referred to, there are some seven million acres of land in permanent grass in Ireland, the average yield of which could, by the application of correct knowledge, be increased very considerably.

There is not, perhaps, in small farm management a greater defect than the usual mode of producing grass. Sometimes the farmer does not sow any grass-seeds at all, but allows the land to cover itself with whatever herbage it throws up naturally. Again, thousands of small farmers put their land into grass when it is reduced by corn crops and bad management to such a state of poverty that it will no longer give even a middling crop of grain.

The state of the cultivated land of Ireland is also very defective, as is well known to all persons of experience. Throughout the country we meet a great many farmers who till their land in a very creditable way; but it is notorious that on the vast majority of small farms the tillage is shallow and imperfect, and that the general management is extremely defective. As a rule, Irish farmers do not follow any systematic course of cropping, or observe any of the principles which modern science suggests for maintaining the land in a productive state. When a proper system of husbandry is adopted on a farm, all the tillage parts of it are manured in a certain number of years and equally enriched; and if the land be well tilled and kept clean, all the crops are heavy and profitable.

Manured root-crops form the backbone of improved husbandry. A great many of the small farmers of Ireland do not grow any manured crop but potatoes. They ought to grow turnips or mangels, or some of both, for feeding their cows in winter and spring.

In many parts of the country little or no artificial grass is grown; and the want of this is perhaps the greatest defect in the management of the small farms. On thousands of these farms there is no hay for wintering the cows; and the result is that the animals are dry during winter and spring; and at the opening of the dairy season in May they come out in a half-starved state.

Tillage is done in a slovenly fashion. By good, early, and deep tillage alone the annual return from every acre of arable land in tillage could be largely increased. Sufficient care is not taken to keep the land clean. In some parts of the country weeds are permitted to grow freely, and to shed their seed; this causes a heavy loss. The yield of the crop is greatly reduced, as the weeds take up the food which would go to feed the crop if the land were kept clean. It is no uncommon thing to find ten tons of weeds and upwards in an acre of potato ground.

The collection and preservation of farmyard-manure do not receive the attention they deserve. The manure made in the "bawns" of thousands of the small farmers of Ireland is not, in reality, farmyard-manure at all, but indifferent compost. A quantity of clay is carted from the headlands or old ditches, and thrown into yards or pits in front of the dwellings; and on this is thrown, daily, kitchen refuse, giving rise to effluvia which poison the air that enters the dwellings. Again, in thousands of cases, manure is left to rot in small loose heaps, by which a good deal of its substance passes into the air; and, in an equally large number of instances, the rain-water is permitted to drain away its substance into the nearest rivulets. It is not quite easy to estimate the loss of manurial matter annually incurred in this way by Irish farmers; but the loss to the farmer is, in reality, far greater than the value of the manurial constituents dissipated, for deficiency in tillage or manure may reduce the crop one-half. The value of the deficiency in the crops of Ireland, arising from bad manures, amounts to several millions sterling per annum.

In the treatment of all farm crops there is bad management in every county. In illustration of this, I may take the hay crop. First, it is often too much exposed to rain, which washes away a large quantity of its nutritive matters. 2nd. It is often too much exposed to the sun, which also lessens its value very considerably. 3rd. By too much exposure, or by fermentation, it suffers loss of fragrance and of colouring matter. We know by experience that there is an enormous difference in the feeding value of hay, according to its colour and fragrance. 4th. The hay is commonly allowed to remain so long in cocks in the fields, that the surface of these cocks becomes drenched by rain and bleached by the sun; and the part in the bottom not only becomes unfit for use, but causes a loss of aftergrass. Putting these several sources of loss together, I estimated some time ago that, on an average, the hay crop of Ireland is deteriorated to the extent of one-fifth of its value. About 1,500,000 acres are meadowed annually; the average yield is two tons per acre; the total produce is, therefore, 3,000,000 tons, which, at 2*l.* 10*s.* per ton, amounts to 7,500,000*l.*; and one-fifth of this, or 1,500,000*l.*, is lost.

The Live-stock of Ireland is not made as profitable as it ought to be. The quality of the animals kept in many places has improved very much of late; but there is still great need for further improvement, especially in the stock kept by small farmers. Evidence of the enormous loss suffered in this way by our small farmers is afforded in the fairs and markets held throughout the country.

Dairy business is badly managed in many parts of Ireland. In butter-making alone there is room for improvement to the extent of 1*l.* per cwt. or about 1,000,000*l.* a year.

The want of drainage is a crying defect in Irish agriculture. In Ireland at least 6,000,000 acres of land are in need of drainage. This work could be effected at a cost of 5*l.* an acre, which, at 5*l.* per cent., would give a rent-charge of 5*s.* an acre; while the increased value of the land consequent on drainage would, on hundreds of thousands of acres of bog and wet cold clay, after a few years, be 1*l.* an acre and upwards. Taking the average at 10*s.*, the annual letting value of the land of the country would be increased by 3,000,000*l.* a year. Many persons will ask, Where is all the capital to execute this work to come from? I answer, that the greater part of it is in the labour of the people. The working farmers of Ireland have a great deal of labour in their families which could be most usefully employed in draining their land.

The want of proper fences is another serious impediment to the progress of improvement on the small farms of Ireland. There are several other defects which need not be specified in this paper.

Every experienced agriculturist who carefully considers the foregoing category of defects, and who has had any experience of Ireland, will agree with me when I say that the small farmers of that country could, by adopting modes of management which are within their reach, double their incomes. The facts adduced in this Report will, I believe, confirm this view. And what a happy solution of many existing difficulties would be effected if the small farmers of Ireland—who form the very backbone of Irish society—could be induced to double their incomes!

I do not say that the Spencer prize system would be a panacea for the evils of Ireland; but, with a knowledge of the wants of the country, which few men have had the opportunity of studying as closely as I have, I do not hesitate to assert that the application of Lord Spencer's prize system for a sufficient number of years in a sufficient number of districts, under men capable of commanding public confidence, would revolutionise the agricultural practices of the small farmers.

In this paper, and in all that I have written, I have studiously avoided all reference to the relative merits of small and large farm systems. In offering to endow his prize system, Lord Spencer guarded himself against the expression of any opinion on that vexed question. He took Ireland as he found it, and honestly sought the best means of ameliorating the condition of the people.

With these introductory observations, I proceed to describe the working of the system in the several districts; and I shall take them in the order in which they were inspected last year, viz.:—

ULSTER	Parkanour, Dungannon, County Tyrone. Cornagilta, County Monaghan.
LEINSTER	Ballinvally, County Westmeath. Garryhill, County Carlow.
MUNSTER	Mungret, County Limerick. Grange, County Waterford.
CONNAUGHT	Killasolan, County Galway. Loughglynn, County Roscommon.

PARKANOUR, DUNGANNON, COUNTY TYRONE.

In Tyrone the average size of the holdings is 24 statute acres. The Poor-law valuation is under 10*l.* on two-thirds of them.

Throughout this county, as elsewhere, the farming is far behind what it ought to be.

Parkanour was selected as one of the districts in which to apply Lord Spencer's prizes for several reasons. The Parkanour school is on the estate of John Y. Burges, Esq., D.L., a wealthy proprietor, who has taken a very active part in the improvement of his property; and the school is on every side surrounded by small farms.

That Mr. Burges approved of the system from the outset I can testify. Unfortunately he confined his pecuniary aid to his own tenants. He believed that the rule by which competition was limited to persons whose valuation did not exceed 8*l.* was injudicious. If any of his tenants won a Spencer prize, he doubled the amount, and he offered prizes to his own tenants whose valuation did not exceed 15*l.* The number of competitors has not been as great as was expected.

The first Spencer prize was won two years in succession by the same person, and the first of the Burges prizes was won in 1873 and 1874 by another. As both dropped out of the competition at the close of 1874, I expected that the number of entries would have increased largely in 1875. Three new competitors did come forward, but four of the old ones declined to enter. In 1876 they remained about the same.

It may be asked why a system so immediately addressed to the wants of the people has thus failed to excite competition? In answer to this question I would add to the drawback first stated, that *in this and in some other districts* a feeling has spread among the less intelligent of the small farmers that their rents might be raised if they succeeded in winning these prizes.

It is unfortunate that this or any notion of the kind should be circulated in connection with this system. I believe such a notion never entered the mind of Mr. Burges. It is not to be disguised that the system, if useful to the tenants in the first instance, must in the course of time benefit the landlords. The person who objects to the Spencer system on this ground, to be consistent, would oppose all means of promoting agricultural progress.

Another and a more powerful cause will be found in the fact that as there have been only three Spencer prizes, those who have been disappointed three times have been discouraged, and the knowledge of their failure has deterred others from coming forward. It will be seen in the Report on the Loughglynn and Grange districts, that when local subscriptions have enabled us to increase the number of prizes considerably, the scheme has developed itself in a remarkable manner, and been followed by most gratifying results.

In 1875 the first of the Spencer prizes was won by George Frizelle, who holds about six statute acres from the Earl of Charlemont. Frizelle manages his farm most profitably. His land and his house and offices present a great contrast to those of some of his neighbours.

In 1876 James Delvin, who holds 6 acres, 3 roods from Mr. Burges, scored as many marks as Frizelle. In the earlier years of the competition Delvin did not feel that he would have any chance of a prize. In 1874 he entered for the first time, and scored 302 marks; in 1875 he obtained 379 marks; and in 1876 he scored 415.

In 1875 the first of the Burges prizes was won by Mr. Henry Hall. Through some cause or other there was only one entry for the Burges prizes in 1876. I have, however, gone to see Hall's farm, which, on the whole, presents a better appearance than it did in 1875. I give a brief notice of the cropping of the land. He holds 11½ statute acres, at a rent which is a fraction under 1*l.* an acre. The crops were:—

A.	R.	P.	
1	1	0	turnips and mangels.
1	2	0	potatoes.
4	0	0	oats, viz.:—
			½ acre laid down with seeds after potatoes.
			1¼ acre laid down after manured roots.
			2¼ acres under lea oats.
2	2	0	meadow, viz.:—

A.	R.	P.	
1	2	0	upland.
1	0	0	lowland hay.

The remainder of the land was in permanent pasture.

The live-stock consisted of 1 horse, 3 dairy-cows, 2 heifers, 2 pigs, and 46 poultry.

The horse is used for farm work, and for conveying Hall and his wife to market, and to prayers on Sundays.

My estimate of the returns from the farm during the year is as follows:—

	£	*s.*	*d.*
Produce of cows	35	0	0
Oats (exclusive of feeding of horse)	21	0	0
Profit on beasts sold, or to be sold	19	0	0
Two calves reared	9	0	0
Potatoes, 5½ tons at 3*l.*	16	10	0
Profit on pigs	6	0	0
Eggs and poultry	6	10	0
	113	0	0

From this is to be deducted:—

	£	*s.*	*d.*
Rent and taxes	12	18	4
Wages and keep of servant	22	0	0
Seeds purchased	1	1	0
Labour in spring and harvest	5	0	0
Hand-feeding for cows ..	1	12	0
	42	11	4

This calculation leaves for the maintenance of Hall and his wife, for casualties, and for profit, 70*l.* 8*s.* 8*d.* I asked Hall what weekly wages would have been equal to the income from his holding. He seemed astonished at my question, but soon made it plain that no rate of wages which could be named would have been an equivalent. That the man has worked very hard there can be no doubt; but he is enjoying the fruits of it. He has a commodious and comfortable house; he is surrounded by every comfort required for a man in his rank of life; and that he saved out of the produce of this piece of land a good deal, I was afforded the most convincing evidence. Yet there is nothing extraordinary in his farming. There are tens of thousands of small farmers in Ulster who would, however, double their incomes, and add largely to their happiness, if they farmed as well as he does.

What he has accomplished is the result of industry, of skill, and of frugality. His landlord has dealt with him on the good old principle of "live and let live," and there is between them the feeling that ought to be universal throughout the land.

The Spencer system has had the merit of bringing this man to the front, and of holding him up as a model farmer.

Among the competitors in 1875 and 1876, there has been one man, James McGinn, who deserves a special notice. Up to November 1873, he lived exclusively by working as a labourer on Mr. Burges' home farm. He then got from Mr. Burges a field containing 1 acre and 1 rood (statute), which became available; to which he added 1 acre 3 roods in November 1874, by purchasing the interest for 14*l.* He borrowed 8*l.* of the purchase-money from a local loan fund, for which he has paid interest at the rate of ½*d.* per pound per week. He got time to pay the remaining 6*l.*

Soon after obtaining possession of the first plot he commenced to build a cottage, which he completed in due time. This cottage consists of two apartments—a kitchen, used as a living-room, and a bed-room. Each apartment is 13 feet by 13 feet in the clear. The walls are built of mud, which is plastered over. The thatch consists of wheat-straw. The floor is made up of a mixture of clay and lime-rubbish. It makes a warm, comfortable home, and is fit, so far as the accommodation goes, for an ordinary labourer or the occupier of one of the smaller holdings. The walls being rough cast, and the windows mullioned as in English cottages, it rises, in its appearance, out of the category of "mud cabins."

A rude but warm and suitable piggery, and a temporary cowhouse, have been added. These will, in due time, be replaced by permanent structures.

The situation being much exposed, the poor man has planted alders and poplars to break the blast; and I am glad to find that they are all doing well. There is an approach, which he has made more passable than the roadways leading to thousands of large farms in Ireland.

I am satisfied that there is no class in the community which deserves more encouragement and countenance than men of this stamp, who evince an honest desire to provide for old age by lifting themselves out of the grade of the dependent poor. If single-handed, he may fail; for in that case a few casualties, or the loss of health, may crush his efforts. But he did not begin until he had two stout sons to take his place if needs be.

The debt has been paid off, and the position of the family greatly altered.

I put it to any one who may read these remarks, whether this man is ever likely to become an object of workhouse relief. The spirit of independence and self-reliance which he has displayed is the best guarantee that he will not.

Mr. Burges sees that his interest, both as a ratepayer and as an employer of labour, as well as his legitimate influence as a proprietor, will be promoted by giving every man like McGinn a legitimate opportunity of establishing for himself a home in which he may spend his old age.

This is not the place to go into this subject more fully. McGinn's farm is undergoing improvement, and need not be described at present. In 1875 he got a prize of 1*l.* from Mr. Burges. This year he gets 1*l.* from the Spencer Fund.

I made on the spot an estimate of the cost of the cottage. The figures have been revised by Mr. Moutray, agent to Mr. Burges, who has had ample means of checking the time which McGinn gave to the work.

		£	*s.*	*d.*
Building mud-walls, 45 days of his own time, at 1s. 8*d.*		3	15	0
Straw for thatch		2	15	0
Thatcher		0	15	0
Timber for roof		0	7	6
Putting on roof, 3 days		0	5	0
Bricks for fireplace and for wall opposite door to protect fireplace from draughts, viz :—				
300 hard, at 2*s.* 6*d.*	7*s.* 6*d.*	0	11	3
300 soft, at 1*s.* 3*d.*	3*s.* 9*d.*			
2 cut stones for fireplace		1	0	0
Lime for plastering, &c. :—				
12 barrels, at 1*s.* 4*d.* each, and 6*d.* per barrel for carriage		1	2	0
Mason, laying foundation	2 days at 3*s.* 4*d.*			
„ building fireplace	2 „ „			
„ „ windows	1 „ „			
Total	5 „ „	0	16	8
Cost of windows		0	12	6
Plastering		0	12	6
		12	12	5

Of the cottage itself I will say that it can be kept quite as clean as, and will be warmer than, many of the show cottages which I have seen erected at a cost varying from 70*l.* to 90*l.* To prevent any misconception, I may add that I do not hold up the materials used in the building of this cottage as the best, or anything approaching to the best; but I do say now, as I said several years ago, and as has since been better said by a very high authority, that mud walls may be used, at all events provisionally, with great advantage in many districts in Ireland in providing decent, though cheap, accommodation for our agricultural labourers.

CORNAGILTA, COUNTY MONAGHAN.

The average size of the holdings in county Monaghan is 15 statute acres. In the district in which Cornagilta School is situated the average is under 10 acres. It was, therefore, a good place for trying the Spencer prize system. It was selected for the purpose, for the additional reason that local co-operation was expected; and it was obtained from Miss Rose, on whose property the school is built.

Unfortunately a feeling soon arose in this, as in some of the other districts, that the co-operation thus accorded on the part of the owners of property was the result of a settled desire to use the system as a cloak for raising rents. This created a formidable difficulty. In the system itself the small farmers and their advisers have from the commencement expressed the utmost confidence; but feelings of the kind indicated, when they arise, are not easily dealt with. At one time it was feared that it would be necessary to withdraw the prizes altogether; but by prudence and perseverance we have been able to continue them.

That the system has succeeded under the difficulties referred to, will be rendered evident by the facts I shall now adduce. And this success is, I submit, the very best proof of its inherent merits.

Compared with districts in the south and west, the number of competitors has been small; but the actual amount of improvement effected on several farms has been very remarkable.

In these Reports it is neither possible nor necessary to give the entire details of every farm inspected. It is enough to take a few typical cases, and to point out the good which has been done. I shall notice, first of all, an upland district on the property of Miss Rose, close to the school. In 1872, the first year of the competition, the first prize was awarded to Patrick Connolly, who scored 340 out of a total of 600 marks, and whose farm was in that year a model for neighbouring small farmers. It forms part of a tract of sloping ground, through which a public road runs. In 1872 a neighbouring farmer, John McAree, scored only 260 marks. For the management of his land, that is, for his mode of raising crops, he obtained only 112½ out of 300 marks. In 1876 this man ranked first, scored a total of 510

marks, and obtained 260 marks for the management of his land, as against 112½ in 1872.

McAree is an old man, who has spent his life in the district. In 1872 neither roots nor artificial grass were raised on his farm, and there was no trace of any principle of cropping.

In 1876 his holding was as well managed as any reasonable man could expect. And all this had been accomplished in five years.

Patrick Connolly is dead, but his family have continued to manage the farm very well. They have enlarged their dwelling, and made other improvements. In 1876 they scored 505 marks; but McAree, who ranked only eighth in 1872, excelled even them.

I come next to another typical case, namely Peter McKenna, who lives in one of the poorest districts in the county Monaghan. He holds 17 acres of what is commonly called "mountain land," the greater part of which has been reclaimed from the state of heather. His land runs up to the top of a hill; on the other side of which, but at a lower elevation than McKenna's farm, the heather can still be seen.

The natural character of the soil will be appreciated when I state that the rent is 5*l.* 1*s.*, and that the Poor-law valuation is 5*l.* Without any pretension to the rank of a model farmer, McKenna has managed his farm in a way which does him credit. It will be seen from the tabular return that it bears a heavy stock. The house and offices attracted my attention as I approached them; and all I saw satisfied me that he is prosperous and happy. The position he has won in this competition will stimulate him to make additional improvements, and his example cannot fail to influence others.

I may say that the land in the district in which he lives is wretchedly farmed. For want of correct knowledge of tillage and manures, too large a proportion of the soil is burned. The cattle are of a very unimproved description, and many of the small farmers are sadly in want of decent house-accommodation. Indeed, some of the houses are in a truly shocking state.

No person appears to take any interest in improving either the agricultural practices of the district or the conditions of the people. I passed tract after tract of land, which is not yielding a fourth of the produce which might be extracted from it. The rents are low.

In some cases neither landlord nor agent has been on the land for years. Yet a land-agent on an extensive property, to whom application was made, wrote to the applicant, saying he thought the money could be better expended! One of the tenants in whom this gentleman is interested, who got his name entered on the list of competitors, and whose holding is one of the worst managed in the entire district, told me the agent had never been on the farm. Now if this tenant were induced (and I affirm that he could be easily induced) to imitate the system pursued by any of the Spencer prize farmers of the district, his annual income would be increased threefold. At present he is steeped in poverty. I will add that it would be incomparably better for him to farm well at double his present rent, than to continue his present system without any rent.

In making these remarks, I desire to guard myself against offering any opinion on the adjustment of rent. I am simply indicating that, according to my experience, persons engaged in the management of landed property in Ireland would best consult the interests of their employers by creating among the tenants a spirit of emulation. If this were done in the district now under consideration, tenants, landlords, and all classes of the community would be greatly benefited.

There is another and more remarkable farmer in this district, to whom I shall next refer: namely, Peter Connolly, who ranked second on the prize list this year, and who ran a dead heat with Patrick Connolly for the first prize in 1875.

He holds 24 statute acres of land from Sir Thomas Foster, Bart., at a rent of 8*l.* 12*s.* 6*d.* Part of the land is reclaimed bog and part cold and very poor upland. In the first year of the competition he scored only 290 out of 600 marks. In 1876 he obtained 490 marks. Since 1872 he has reclaimed 4 statute acres of heath land; and only a small plot now remains to be improved.

This year the land is apportioned thus:—

A.	R.	P.	
2	3	0	manured crops—potatoes and turnips.
2	0	0	meadow.
7	0	0	oats.
10	2	0	grazed.

The remainder is under roads, buildings, and waste.

One peculiarity of his management is that he does not sell any corn. His sales consist of the produce of his cows, of pigs, and of poultry and eggs. His family consisted last year of himself, his wife, and seven children. One of the sons has this year joined the Royal Irish Constabulary. Connolly keeps five cows, a brood sow, and a large number of poultry. A calf or two are reared every year, and the produce of the sow are sold as slips. There were at the time of my visit eleven of these for sale, worth about 25*s.* each. Two litters are sold in the year.

After supplying the wants of the family, 6 firkins of butter were sold last year. And the return from poultry may be estimated from the following figures:—

The sale of eggs exceeds 5*l.* a year. Six dozen of chickens were sold last year, at an average of 1*s.* each; 13 turkeys and 5 geese were also sold.

The food purchased for the live-stock costs between 2*l.* and 3*l.* a year.

The house presents all the appearance of a happy home. It is not too much to say that if all the improvable small farms of the county Monaghan were improved to the same extent as those described above, the incomes of their occupants would be doubled, their comforts and happiness would be increased in a still greater degree, and the entire aspect of society in the district would be permanently improved.

BALLINVALLY, NEAR CASTLETOWNDELVIN, CO. WESTMEATH.

The greater portion of the land of Westmeath is divided into large holdings, which are occupied by graziers.

In several parts of the county there are a good many small farms. This is the case in the neighbourhood of Ballinvally National School, which is on the property of the Right Hon. Col. Tighe, of Woodstock, county Kilkenny, and is within a mile of Castletowndelvin.

Ballinvally was accordingly deemed to be a good district in which to try the Spencer scheme.

For want of local aid, the system has not been as beneficial as elsewhere. From the outset, Col. Tighe was good enough to encourage his own tenants to compete by offering to give to any of them who might win a prize the same sum as Lord Spencer.

As nothing was done to increase the number of prizes beyond the three originally endowed by Lord Spencer, those who failed in the earlier years became disheartened.

The working of the system in this district has, however, proved its capability of effecting the objects which Lord Spencer had in view. As an illustration, I instance the case of James Johnston, who holds 6 a. 3 r. 20 p. (statute), from Lord Greville, at a rent of 6*l.* 16*s.* 1*d.* a year. This man competed for the first time in 1873, when he scored 272 marks out of a total of 600, and got third prize. At the time he appeared to me to be a most industrious and deserving man. The system of cropping he pursued was, however, so defective, that for cultivation of the land he got only 100 out of 300 marks. There were neither roots nor artificial grass. The advantages of these crops were quietly explained to him. He seemed to understand and appreciate the suggestions offered. One of the Judges offered to make him a present of as much grass-seeds as would sow a piece of ground which was suitable for them. In due time he reminded the Judge of his promise: the grass-seeds were sent down and produced a fine crop the year after.

In 1875 and 1876, Johnston bought grass-seeds himself, and now his farm is cropped so judiciously that I have given 250 marks for the cultivation of the land.

In the "offices" several changes and improvements have been made. The manure-heap used to be in front of the entrance to the dwelling, and the piggery used to be next to the bed-room. A very suitable piggery was erected in 1875, in the most remote corner of the yard, and a nice wall was built in front of the house, and the manure-heap was removed to a site in front of the piggery. Johnston's holding and premises will bear comparison with those of the prize-takers of the other districts. His circumstances are greatly altered. A few days before my last visit he lost two pigs, worth about 10*l.*; but he can bear the loss very well, large though the amount be to him.

This man was easily led into pursuing an improved system of management. If all the small farmers of Westmeath, or even a large number of them, were encouraged in the same way, the amount of good done would be incalculable; and that it is desirable to effect a radical change of some kind is well known to all persons who know the wants and feelings of the people of that county.

The other competitors who deserve a passing notice, are Widow Anderson, Widow Paterson, and James Kavanagh, all of whom in 1876 ranked equal in the sum-total of marks. The holding of each of them now possesses a good deal of merit. Widow Paterson has the best field of artificial grass in the entire district, and the winter culture which is given by the Widow Anderson to her stubble land in preparation for roots and potatoes is everything that could be desired. The following figures will show the progress made by them since 1873:—

	Marks obtained.	
	1873.	**1876.**
Widow Anderson	325	Each 430 marks.
Widow Paterson	273	
James Kavanagh	271	

GARRYHILL, COUNTY CARLOW.

The Garryhill National School is on the Carlow estate of the Rt. Hon. the Earl of Bessborough, whose efforts to improve his property are well known.

As there is a very large number of small farms in the district, the school was selected as one of the centres for Lord Spencer's prize system. Lord Bessborough has co-operated in promoting it, not only by avowing his approval of the principle, but by subscribing to the fund. He distributes among his own tenants who appear on the merit list a sum equal to Lord Spencer's contribution.

In each of the past two years we had for distribution 20*l.*, viz.:—

	£	*s.*	*d.*
Lord Spencer's contribution	7	10	0
Lord Bessborough's contribution	7	10	0
Irish Peasantry Society of London	5	0	0

The interest which the system has excited in parts of this district is very great indeed. In one part of it the influence of the competition has been fully equal to anything I have seen elsewhere. I refer now to Coolasnaugh, which is a valley surrounded by mountains.

The name is of Irish origin; in English it relates to snow. True to its name, the background was covered with snow on the day of my visit, while the country all round was free from it.

In this valley all the competitors can be seen at once. Each can see daily the farms of the others, and observe improvements as soon as they are commenced.

In going to this valley in 1876 we had to ascend a sharp hill; after the ascent we reached a point from which the entire valley can be seen. To me, who had seen it several times before, it presented on this occasion an improved appearance which I cannot adequately describe. I saw it first in 1873. Since then the dwellings and offices have been improved; more grass-seeds and roots have been raised, and the area of arable land has been increased.

Knowing that Lord Bessborough, to whom this valley belongs, has been actively engaged in promoting improvements, it became necessary for me to inquire how far the Spencer prizes had aided his efforts. In prosecuting this inquiry every facility was given to me by his Lordship's under agent, Mr. Henry Nolan, of Garryhill. No man could know better than Mr. Nolan the improvements effected by Lord Bessborough himself, and he stated in the most emphatic manner that the Spencer prize system had aided powerfully not only in the valley of Coolasnaugh, but in the entire Garryhill district, in promoting among the people an increased taste for improvements. And it must be gratifying to Lord Spencer to find that Lord Bessborough takes the same view of it. The success of the system in this valley goes to show that the smaller the area of competition the more direct and powerful is the effect. Indeed the success of the system in this valley appears to me to suggest that its scope ought to be expanded in some such way as the following :—

Let a large area, say a county or a number of baronies, be subdivided into a number of small districts, give a great many small prizes in each, and let there be a few sweepstakes for the best farmers in all these districts. Let there also be a number of sweepstake prizes for all Ireland. In this way a spirit of emulation would be created among small farmers who are personally known to each other, while a useful spirit of rivalry would be promoted among the different groups of districts throughout the entire country.

I now proceed to give brief notices of some of the small farms in this district for which prizes were awarded.

The first in point of merit is that of Charles Doyle, who, having previously won three prizes, was disqualified.

In 1873	he scored	440	marks.
In 1874	„	496	„
In 1875	„	505	„
In 1876	„	525	„

He holds 7 a. 1 r. 0 p. statute from Lord Bessborough. The holding is divided into four fields. In 1876 one was cropped with turnips and mangolds; one was under oats, with which grass-seeds were sown; a third was cropped with lea-oats; and of the fourth one-half was under potatoes, and one-half in grass, which was cut and given to the cow in the house. The stock consisted of a cow and heifer, two brood sows and nine store pigs, about 60 poultry, and a pony. The land is clean and well cultivated; indeed, the farm will bear comparison with a well-managed small farm in Belgium. Among the "rolling-stock" I observed :—

	£	s.	d.
(1.) A cart which cost	6	0	0
(2.) A plough	2	2	6
(3.) A convertible grubber	1	10	0
(4.) A harrow	1	12	6
(5.) A stone-roller	0	11	0
(6.) Sundry small implements	1	0	0

His neighbour, Patrick Ryan, who scored 505 marks, and whose farm is also a *bonâ fide* model, was also disqualified under the same rule as Doyle. On his holding of 5 a. 2 r. 36 p., there are implements to the value of 12*l.* 10*s.* The implements on our large farms do not on an average amount to more than 20*s.* per acre, if so much.

Doyle lives exclusively on the proceeds of his holding. Ryan deals in cabbage-plants in spring. Ryan's receipts from the sale of pigs in 1876 were close on 40*l.* He also sold twenty-five couples of poultry at 6*s.* a couple. Most of the eggs were used by the family. Both Doyle and Ryan are in very comfortable circumstances. Doyle has a good slate house and suitable farm offices. Ryan made an addition to his offices during the year. Each had at the time of my visit a large quantity of well-made manure, which was kept away from the front of the dwelling.

Widow Doyle and Patrick Nolan scored the same number of marks (505) each as Patrick Ryan. The progress of improvements in the farms of both is very interesting, and aptly illustrates the good effect of the Spencer prize system. In 1874 Mrs. Doyle scored 410 marks; in 1876 she obtained 505. She holds 19 a. 1 r. 30 p., at the rent of 11*l.* 14*s.* In 1876 the crops were:—

	A.	R.	P.
Mangolds and turnips	2	0	0
Potatoes	3	0	0
Oats with seeds	3	0	0
Lea-oats	3	2	0
Grass grazed	3	3	20
Grass meadowed	3	2	0

The remainder was under garden, buildings, roads, &c.

The live-stock at the time of inspection consisted of 1 draught animal; 2 cows; 2 heifers; 1 calf; 1 sow in young, and 3 fattening pigs; also 9 sheep.

The cash receipts during the year included 18*l.* for two heifers, 3*l.* for one weanling bullock, and 23*l.* 6*s.* for five fat pigs. The reader can estimate from data given elsewhere the probable income derived from butter, eggs, poultry, and oats. The gross return from this holding during the year was very large. The family consists of the widow and six children. The house was clean and comfortable.

The case of Patrick Nolan, of Coolasnaugh, is still more remarkable. In 1873, when I first inspected his farm, he scored 381 marks; in 1876 he got 505. He holds about 30 statute acres at a rent of 10*l.* 16*s.* He has since reclaimed and improved several fields, added to his buildings without asking aid from Lord Bessborough, and adopted an improved system of cultivation. The crops in 1876 were:—

	A.	R.	P.
Potatoes	4	0	0
Turnips	1	3	0
Mangolds and cabbage	0	2	0
Oats with seeds	3	3	0
Lea-oats	4	3	0

The rest of the land was in grass.

The stock consisted of 4 cows, 2 heifers, 3 weanling calves, 1 sow and 6 store pigs, 100 sheep, of which 40 were breeding-ewes. In summer the sheep are grazed on Lord Bessborough's mountain, at the rate of 1*d.* per head per week; and in winter grazing land is hired for them. At the time of my visit the old sheep were on a piece of grass, hired until April, at 12*l.* 7*s.* A few pounds more will have to be paid to bring them through April and a part of May. The income of the family is far above the average of the small farmers of the district.

The sales in 1876 included:—

	£	*s.*	*d.*
3 young heifers	13	0	0
2 young bullocks	10	0	0
20 sheep, at an average of 29*s.*	29	0	0
(Owing to the state of the market, the lambs were held over.)			
Wool	28	6	0
Pigs	31	17	8
(There were 6 fine stores on hand, which were reared during the year.)			

I would next advert to the holding of James Dixon, the history of which, since I first saw it, is most suggestive. The progress effected in one year will be understood when I state that in 1875 he scored 404 marks, and in 1876 he obtained 505. The farm contains 9 a. 2 r. 35 p., statute, and is held at the yearly rent of 6*l.* 7*s.*

The crops in 1876 were:—

		A.	R.	P.
Manured crops	Potatoes	1	2	0
	Mangolds and turnips	0	3	20
Oats with seeds		1	3	0
Lea-oats		2	0	0
Pasture		3	1	0
Garden		0	1	0
Buildings, &c.		0	0	15
		9	2	35

During the year a new apartment was added to the dwelling-house at a cost of about 20*l.*, towards which the landlord contributed 4*l.* 10*s.* It is roofed with slate and lofted; the apartment downstairs being used as a sitting-room and the one upstairs as a bedroom. New faces have been put to some of the old fences, and one very good new fence has been erected and provided with a double row of quicks. The headlands have been made to incline towards the fences to facilitate the escape of surface water. One or two other improvements have been suggested, and when these shall have been effected, the holding will be in as good a state as could be expected.

Peter Fox holds the next place on the merit list. He occupies 10 a. 2 r., at the yearly rent of 7*l.* When I first inspected the farm it was very fairly managed. Sundry improvements have been effected since, in buildings, in fences, in the cropping of the land, and in the management of manure. The family consists of Fox and his wife, three sons and one daughter. The eldest son is a "handy man," and earns a good deal as a mason; the second spends part of his time working on the farm and devotes the remainder to dealing in sheep and "springers." The holding consists of a paddock, which contains two roods, a garden which contains one rood, and four fields, which are in very good condition.

The crops in 1876 were —

	A.	R.	P.
Potatoes	1	0	35
Roots	1	1	26
Oats	1	2	19
Meadows	1	1	26
Grazing (including paddock)	4	3	30

The stock consisted of:—

2 cows (the calves of which are reared).
2 heifers.
1 sow (part of the produce of which are sold as stores and part fattened.)
1 pony.
50 poultry.

As the farm does not produce straw enough to meet all the requirements of the system pursued, two or three acres of oats are purchased every year on "foot," from which, after paying 9*l.* an Irish acre last year, he did not derive much advantage beyond getting the straw cheap. The oats raised on the farm are ground into meal and used by the family.

Two sets of pigs of five each are fattened in the year, and as many more are sold as "slips." The total receipts from pigs in 1876 exceeded 60*l.* The heifers are sold at 18 months or 2 years old, grazing being generally hired for them for six months of the second year.

That a large quantity of milk and butter is used in the family is made known by the fact that although in 1876 two good cows were kept, only one firkin of butter was sold.

For want of space I cannot notice any of the other competitors, but the tabular statement of facts (Table I., pp. 414, 415) appears to me to be so interesting, that I give it *in extenso.*

TABLE I.—RESULTS of the SPENCER PRIZE

Names.	Landlord.	Rent.			Poor Law Valuation			Tillage.			Grass.		
		£	s	d.	£	s.	d.	A.	R.	P.	A.	R.	P.
Charles Doyle	Lord Bessborough	7	11	0	3	0	0	All except paddock.					
Patrick Ryan	Ditto	3	14	0	1	10	0	4	1	36	1	1	0
Widow Doyle	Ditto	11	14	0	7	10	0	12	0	10	7	1	20
Patrick Nolan	Ditto	9	16	0	5	10	0	14	3	0	15	1	0
James Dixon	Ditto	6	7	0	5	0	0	6	1	3	3	1	0
Peter Fox	Ditto	7	0	0	8	0	0	4	1	24	6	0	16
Thomas Lawless	Ditto	13	5	0	7	10	0	10	2	0	8	3	30
John Fenlon	Ditto	10	10	0	7	10	0	10	2	0	10	3	9
Michael Hogan	Philip Newton, Esq, D.L. ..	16	13	0	6	15	0	9	0	25	7	1	15
James Fitzpatrick	Lord Bessborough	12	0	0	6	15	0	17	2	10	22	3	29
Michael Neill	Ditto	9	8	0	6	0	0	9	3	9	11	1	0
Widow Hickey	Ditto	3	8	0	2	0	0	2	2	0	1	0	0
James D'Arcy	Ditto	3	16	0	3	5	0	5	1	2	0	3	9
Widow McDonnell	Ditto	3	5	0	3	0	0	5	3	9	1	1	2
Widow Fitzgerald	Ditto	5	10	0	3	15	0	7	0	4	1	0	11
John Caulfield	Philip Newton, Esq., D.L. ..	7	14	4	5	15	0	5	2	15	2	2	10
Patrick Fleming	Ditto	2	8	0	2	5	0	2	2	14	1	0	0
Moses Connor	Lord Bessborough	11	16	0	5	10	0	12	1	21	20	0	0
Philip Cavanagh	Ditto	4	7	0	3	5	0	7	2	0	1	2	0
James Spruhan	Ditto	5	0	0	5	10	0	3	1	36	3	0	0
Bart Brien	Ditto	3	0	0	2	5	0	3	1	0	1	1	0
John Fitzpatrick	Ditto	3	10	0	2	10	0	3	1	17	1	2	0

COMPETITION in the GARRYHILL DISTRICT, 1876.

Total Area.			LIVE-STOCK KEPT							MARKS ALLOWED FOR MERIT.						
A.	R.	P.	Draft Animals	Cows.	Heifers.	Calves	Sheep	Pigs.	Poultry	Farm Management	Live-Stock	Offices.	Manure.	Garden.	Dwelling.	Total Marks, 600.
7	1	0	1 p.	1	1 w.	..	..	11	60	285	65	45	45	40	45	525
5	2	36	1 p.	1	..	1	..	3	60	265	70	45	45	40	40	505
19	1	30	1	2	2	1	9	4	100	265	85	45	45	20	45	505
30	0	0	1	4	2	3	100	7	60	275	85	45	40	20	40	505
9	2	3	1 h.	1	1	..	4	4	30	280	75	30	40	30	45	500
10	2	0	1	2	..	2	..	1	50	260	75	45	45	30	45	500
19	1	30	1	2	1	1	8	4	40	270	75	35	40	25	45	490
21	0	9	1	1	..	1	6	5	40	250	75	35	40	45	45	490
16	2	0	1 ass	2	1	2	8	2	50	255	80	35	35	40	45	490
40	1	39	1	3	2	3	..	..	50	265	80	48	35	20	40	488
21	0	9	1	4	3	1	50	4 stores, 1 sow and young	40	265	90	35	30	20	40	480
3	2	0	1	1	..	..	..	2	40	235	75	45	45	35	45	480
6	0	11	1 j.	1	..	..	9	2	12	258	70	30	35	40	45	478
6	0	11	1 j.	1	..	..	2	1	40	250	70	35	40	30	40	465
8	0	15	1 j.	1	1	1	3	3	40	230	80	40	40	25	48	463
8	0	15	1 ass	2	1	1	..	4	40	230	70	40	35	35	40	450
3	2	14	1 j.	1	1	..	..	4	15	240	65	38	35	25	38	441
32	1	21	..	2	2	..	15	2	30	240	65	38	38	25	30	436
9	0	0	1	2	..	1	14	4	60	245	80	35	30	10	35	435
6	1	36	1 j.	1	1	..	18	..	30	230	70	30	35	25	40	430
4	2	0	1 j.	1	1	1	12	2	40	240	50	30	40	25	35	420
4	3	17	..	1	..	1	6	Sold.	20	200	65	30	30	25	45	395

MUNGRET, COUNTY LIMERICK.

The Mungret Agricultural School is within three miles of the city of Limerick. There are many small farmers in the district, and the state of agriculture is more backward than could be expected.

I was unable to take part last year in the inspection of the farms which were entered for the Spencer prizes, but in the preceding years I found that the system had been productive of the most beneficial results. Indeed, I do not know any place in which it could be carried on with greater advantage. I have found a laudable desire among persons in the district to co-operate in furthering it; among whom I may mention the Hon. Hugh Massy and the late Mr. Michael Robert Ryan, J.P., of Temple Mungret.

GRANGE, COUNTY WATERFORD.

Considering its proximity to towns and cities, there are few districts in Ireland more backward than that through which runs the public road that connects Youghal with Dungarvan.

It is bounded on the south and east by the sea, on the west by the Blackwater, and on the north by the ridge of land which at Dungarvan overhangs the canal.

The Irish language is still spoken in this district by the greater number of the old, and by a large number of the young people.

The district comprises an area of some 50,000 acres, which are occupied chiefly by small farmers, whose agricultural practices have hitherto been of a primitive character.

The Grange National School is situated in the western part of this district, about six miles from Dungarvan and four from Youghal. The school is on the property of Sir Richard Musgrave, Bart. Finding that the rudiments of modern agricultural knowledge were little known among the small farmers, the late Sir Richard Musgrave, as manager and patron of the school, in 1863 determined on engrafting elementary instruction in agriculture on the ordinary school curriculum. A piece of land, containing two statute acres, which was then attached to the school, has been cultivated since as a school-farm.

The seeds of agricultural knowledge thus sown must in due time bear fruit. The boys acquire useful information on soils, manures, crops, and live-stock. But the benefits of agricultural education will be more felt in the next than in the present generation. Lord Spencer's letter to the Commissioners of National Education showed that he saw the advantage of using the primary schools for conveying agricultural knowledge to the future small farmers in Ireland; but he evidently saw also that something more was required to bring a taste for improvement immediately home to the doors of the present generation of small farmers. It is manifest that it was with this view that he established the prize system on which it is now my privilege to report, and which I have watched with no ordinary care during the five years it has been in existence. For reasons which it is unnecessary to state here, I have studied its effects in this district with especial care; and after having done so, I am in a position to state that if any intelligent person entertains a doubt as to the great public utility of exciting among our small farmers a spirit of improvement, it would be completely dispelled by such inspections as I have made of the small farms of Grange since 1872.

The competition has evoked an extraordinary amount of enthusiasm among the people themselves. It was warmly espoused by the late Sir Richard Musgrave and by the late parish priest, the Rev. P. Wall. The zealous curate, the Rev. J. Walsh, has been equally earnest in supporting the system. The present Sir Richard Musgrave has promised a subscription of 5*l.* a year; and I believe I am right in thinking that the present parish priest, the Rev. J. Shannahan, accords to it his hearty approval. Lord Stuart de Decies contributed 5*l.* to the fund in 1874. No other proprietor has manifested an active interest in the scheme. This may arise from the fact that its objects and advantages have not been made sufficiently known.

In a circle of ten miles' diameter surrounding the Grange National School there are several districts which differ so much in soil and other circumstances, that a really meritorious small farmer in one cannot show the same striking results as a man of equal merit in another. To illustrate this point I mention two of these districts, namely,—First, the tract of warm sandy ground close to the town of Ardmore; second, a large tract of very poor mountain land, which is situated in the "old parish." Many of the competitors in the old parish occupy the "mountain" land of Gortane, and are the tenants of Lord Stuart de Decies. Throughout this part of the district the land, which is naturally wet, cold, and unproductive, is undrained and badly managed, and the dwellings of the small farmers are very bad indeed. The rents are low: at all events, the want of prosperity cannot be ascribed to high rents.

If the landlord would establish a system of prizes in this peculiarly backward district, on the basis of the Spencer plan, he would, in a few years, quietly and silently effect a radical improvement in the condition of the people.

I shall now make a few remarks on the farms of some of the prize-takers.

In the first year of the competition, John Wynne obtained first prize and scored a total of 365 marks. In 1876 he obtained 497 marks. He has held his ground in the interval very well; but others, in whose farming there was more room for improvement, have made greater progress. He holds 6 a. 0 r. 12 p., divided into five fields, which in 1876 bore the following crops. One field of 2 a. 0 r. 0 p. was in permanent pasture. The tillage crops were:—

1. One piece of potatoes, 1 a. 3 r. 0 p.
2. Wheat, 1 a. 0 r. 0 p. Last year, the crop being lighter than usual, the produce was 6 barrels, which were sold at 23*s.* 6*d.* each. In 1875 the yield was 9 barrels per acre.
3. 1 a. 3 r. 0 p., of which 1 a. 2 r. 0 p. were under potatoes, and 0 a. 1 r. 0 p. grazed by a jennet.
4. Manured roots, viz.: turnips, 0 a. 2 r. 0 p.; mangolds, 0 a. 1 r. 0 p.; carrots, 0 a. 1 r. 0 p.

The remainder of the holding is occupied by the garden, house, offices, and roads. The live-stock at the time of my visit consisted of a very good jennet, a very good milch-cow, an excellent yearling out of her, two pigs, and a large number of poultry.

The potatoes are used by the family, which consists of Wynne, his daughter and son-in-law, and their two little children.

In 1876 the sales included the wheat above referred to, butter, pigs, and a yearling heifer, which was sold in February for 9*l.*

Of butter, twelve "rolls" of 15 lbs. each were sold at an average of 1*s.* 1*d.* per lb.

From 1 lb. to 1½ lb. of butter was kept for home use out of every roll. The greater number of the eggs having been consumed by the family, the receipts from this source did not exceed 30*s.* in the year.

The following figures show that a considerable income was derived from pigs. Six were sold fat during the year 1876, viz.:—

	£	*s.*	*d.*		£	*s.*	*d.*
2 bought in January for	3	0	0	net	7	10	0
Sold in March for ..	10	10	0				
2 bought in March for	4	17	0	net	7	3	0
Sold in June for ..	12	0	0				
1 bought in June for	2	0	0	net	3	0	0
Sold in September for	5	0	0				
1 bought in September for	1	5	0	net	3	9	0
Sold in November for .	4	14	0				
					21	2	0
Deduct cost of 5 sacks of Indian meal, at 21*s.* each ..					5	5	0
Leaving to the credit of farm					15	17	0

It will be seen that the net cash receipts amounted to 41*l.* 5*s.* 6*d.* which was available for buying flour and other necessary articles of diet, for paying rent and taxes, and for putting by something for the "rainy day." The son-in-law, John Kennedy, earned, outside the farm, a sum of 4*l.*, not accounted for above.

The return from the labour applied to the farm is very satisfactory. What a happy country this would be if all the small farmers were as prosperous as this man!

I should like to give similar details regarding every small farmer in this district, who has won a prize; but if I did so, this paper would run to too great a length.

John Fitzgerald, who is at the top of the list, was a farm-labourer until 1873, when he got into possession of his holding, which he has already improved very much.

John Troy, who scores the same number of marks, has made very great progress since 1872. In that year he scored 310 marks; in 1873, 337 marks; in 1874, 438 marks; and in 1876, he scored 497 marks, and ranked equal to Wynne. Troy's holding is now admirably cropped.

In the management of Flynn's farm, who obtained fourth place, there are several features of merit.

John Bumster, who took the fifth prize, affords on his holding a very fair model for many farmers in his district, which is several miles from the centre of either of the two districts referred to above. He holds 8 a. 3 r. 27 p., for which he pays a rent of 9*l.* 16*s.* There are seven fields, three of which, containing 3 a. 1 r. 0 p., are in permanent pasture; and four, containing 4 a. 3 r. 27 p., are in tillage. Roads, gardens, and buildings occupy 3 roods. The crops in 1876 were:—

	A.	R.	P.
Potatoes	1	2	0
Turnips	1	0	0
Wheat	1	2	0
Oats with seeds	0	3	27
	4	3	27

The live-stock kept during the year consisted of 2 cows, 1 calf, 1 pony, 3 sets of pigs, and a large number of poultry. The sales during the year were:—

	£	s.	d.
9 barrels of wheat, at 22*s.*	9	18	0
8 barrels of oats, at 12*s.* 6*d.*	5	0	0
Pigs: 3 sets of two each, less cost of Indian meal ..	17	5	0
1 calf	0	9	0

The cows calved in spring. For the first month they produced 15 lbs. of butter per week; after which the quantity went down to 12 lbs., and gradually decreased. One pound (1 lb.) per week was kept for the use of the family. The entire butter sold realised 18*l.* 15*s.* One very good calf was reared. The sale of eggs exceeded 12*l.*

All the tillage of the farm and the feeding of the cows, pigs, and fowl are done by the family, whose prosperity and happiness are very apparent.

Finally, I would refer to Thomas Hennessy, who holds three acres of land opposite the entrance to the residence of the late Father Wall. Of this little holding, which adjoins the public road, I was able to say, in the Report of 1874, that it formed quite a feature in the district. The land has been always clean and well cropped. The fences have been well kept. Year after year I found some progress effected. Last year (1876), among other improvements, a pair of gate-piers were erected, which on this little farm present a most imposing appearance, and which will long remain a monument to the spirit of emulation engendered by the Spencer prize system.

In Table II. (pp. 422, 423) I give in detail the merit list.

KILLASOLAN, COUNTY GALWAY.

The Killasolan School is on the estate of Lord Clonbrock, who has subscribed to the Spencer Prize Fund. His agent, Charles Filgate, Esq., J.P., has also encouraged it, and has expressed to me the opinion that he wished the Local and other Agricultural Societies would expend in some such way the money now spent on dinners and in other useless ways! I regret to say that I was unable to take part in the adjudication in this district last year; but from what I saw in the preceding years, I am in a position to state that the system worked there most satisfactorily.

LOUGHGLYNN, COUNTY ROSCOMMON.

The Loughglynn School is on the estate of Viscount Dillon. It has for years been connected with the National Board. An idea of the extent to which small farms prevail in this district may be gathered from the fact that on Lord Dillon's estate, of which the rental is about 24,000*l.* a year, there are 4500 tenants, which gives an average rental of less than 5*l.* 10*s.* per tenant. The circuit of five or six miles radius selected by Lord Spencer does not contain the whole of Lord Dillon's property, and embraces a large part of the estate of Lord De Freyne, and a small part of the estates of the O'Conor Don, M.P., and of Mr. Sandford, D.L. The names of several other proprietors appear in the tabular return appended to this Report.

In 1872 the Judges had for distribution the sum of 7*l.* 10*s.* contributed by Lord Spencer, which was given in three prizes, viz.:—

	Marks.
First, 3*l.* 10s., to John Jordan, a tenant of Lord Dillon's, who scored	423
Second, 2*l.* 10s., to Charles Lampey, a tenant of Lord De Freyne's	355
Third, 1*l.* 10s., to Peter Crawley, a tenant of Lord Dillon's ..	350

There were thirteen competitors; and a few of those who did not come out well were discouraged. In 1873 it so happened that a small sum was added to Lord Spencer's contribution, and with his approval I divided the whole into five prizes, as follows:—

	Marks.
First and Second. John Jordan Peter Crawley	453 each.
Third. Charles Lampey	398
Fourth. Thomas Conway, a tenant of the O'Conor Don's	260
Fifth. Martin Malony, a tenant of Lord Dillon's	258

Several very striking results were observable in that year. While Jordan improved his position, Crawley advanced to a level with him.

In the Report for 1873 statistics of only seven farms were tabulated; the total marks for the seventh being 225; and on the face of the return it was observed that the others were so low in the scale of merit as to render it unnecessary to fill up the particulars regarding their farms.

Very soon after the result of the competition for 1873 was published, the O'Conor Don, M.P., visited Thomas Conway's farm. That he was pleased with the industry and merits of the man, and convinced of the soundness of the Spencer prize system, is evident from the fact that he made Conway a present of 10*l.* on the spot, and that he has since contributed 5*l.* a year to the prize fund.

Mr. Strickland, J.P., on the part of Lord Dillon has done the same thing.

This led to an increase in the number of competitors in 1874, a further increase in 1875, and in 1876 the entries were so numerous, that the teacher, Mr. Fallon, had to make a selection for me. I inspected 31 farms.

In my remarks on the effects of the scheme in Parkanour, Cornagilta, and Grange, I was able to give several illustrations of the progress made; but in the Loughglynn district every farm I inspected in 1876 afforded some evidence of the beneficial effects of the system. The whole district has been leavened. In 1872 and 1873 farms which were full of weeds, and without any freshly sown grass-seeds or roots, were in 1876 clean and well cultivated, and had a fair proportion of both classes of crops. Farms which in 1873 were so low in the scale of merit that it was useless to give statistics regarding them, were in 1876 very fair models of good cultivation.

I shall briefly describe some of the prize-farms; but, before doing so, I may state that there is not in the Loughglynn district the diversity of soils to which I referred in my remarks on the Grange districts. As a rule, every farm contains some reclaimed bog and some upland. In the west, or Mayo, side of the district the huge stone walls which inclose small fields

TABLE II.—RESULTS of the SPENCER PRIZE COMPETITION in the GRANGE DISTRICT, 1876.

NAMES OF COMPETITORS.	LANDLORD.	Area of holding Statute Measure.			Yearly Rent.			Poor-Law Valuation.			Area under Tillage			Area under permanent Grass.			Live-Stock kept.							Marks allowed for Merit.						
		A.	R.	P	£	s.	d	£	s	d.	A	R	P	A.	R.	P	Draught.	Cows.	Heifers	Calves.	Sheep.	Pigs.	Poultry.	Farm Culture.	Live-Stock.	Farm Offices.	Manure	Garden.	House.	Total Marks 600.
John Fitzgerald ..	Sir R. Musgrave..	6	0	0	9	0	0	5	10	0	4	2	0	1	2	0	1	1	..	1	8	3	42	250	75	46	40	40	46	497
John Wynne ..	Sir R Paul	6	0	12	7	6	0	6	15	0	4	0	12	2	0	0	1	1	1	..	..	..	20	260	80	42	40	35	40	497
John Troy	Mr O'Dell	6	0	0	7	10	0	4	0	0	5	2	0	0	2	0	1	1	1	.	..	3	30	265	75	40	40	37	40	497
Patrick Flynn ..	Lord Stuart.. ..	18	0	0	2	11	7	6	15	0	7	0	0	11	0	0	1	2	1	1	2	2	50	240	75	45	40	32	40	472
John Bumster ..	Mr. Tracy	8	3	27	9	16	0	7	0	0	4	0	0	3	0	0	1	2	1	..	..	3	40	260	75	40	35	32	38	480
John Grady.. ..	Mr O'Dell	5	0	0	9	0	0	4	15	0	5	0	0		..		1 jennet	1	..	..	..	2	20	240	60	46	40	45	42	473
Patrick Mulcahy	Sir R. Paul	6	0	0	9	0	0	5	10	0	5	0	0	1	0	0	1	1	..	1	2	2	32	255	60	38	35	30	38	456
John O'Dea	Lord Stuart ..	13	0	0	1	18	0	6	10	0	8	0	0	5	0	0	1 ass	3	1	..	..	2	34	235	70	30	35	35	38	443
Michael Corbett ..	Mr. O'Dell	6	2	0	10	12	0	6	10	0	5	3	0	0	3	0	1	..	..	..	4	3	30	230	50	40	35	30	38	423
Michael Hennessy	Sir R. Paul	3	2	0	5	4	6	5	0	0	2	1	0	1	1	0	1	1	..	..	..	3	30	235	70	45	45	30	35	460
Michael Allen ..	Ditto	3	0	0	4	5	2		..		3	0	0		..		..	1	..	..	3	..	18	230	60	25	42	30	35	422
Michael Atkins ..	Mr. O'Dell	4	0	0	6	2	0	6	10	0	3	0	0	1	0	0	1	..	..	..	..	7	10	250	15	42	35	30	35	407
Philip Loughlin ..	Lord Stuart.. ..	12	0	0	2	0	8	8	0	0	8	0	0	4	0	0	1	..	..	..	4	..	24	200	45	42	38	35	45	405
Thomas O'Brien..	Ditto	9	0	0	0	0	6	4	5	0	6	0	0	3	0	0	1	1	1	..	2	7	29	200	70	35	25	35	35	400
Cornelius Brien ..	Mr. O'Dell	5	2	0	10	10	0	5	0	0	4	2	0	1	0	0	1	1	..	..	..	4	20	210	60	38	38	25	38	409

Maurice Lacy ..	Lord Stuart	8 0 0	1 15 0	..	5 0 0	3 0 0	1	1	1	..	5	2	28	210	65	30	35	32	25	397
John Deacon ..	Mr O'Dell	7 1 0	13 12 0	7 12 0	4 1 0	3 0 0	1	2	..	..	..	4	6	200	60	35	30	35	35	395
Thomas Cotter ..	He has three Landlords..	7 0 0	8 10 0	7 0 0	4 0 0	3 0 0	1	1	1	..	..	2	16	210	55	32	32	25	40	394
Thomas Kelly ..	Mr. Fitzgerald ..	3 1 0	4 5 0	3 5 0	2 3 0	..	1	..	..	..	4	4	45	245	50	40	15	40	42	432
Thomas Morrissy	Lord Stuart	5 2 0	4 3 9	3 5 0	2 1 0	3 1 0	1	1	..	..	7	..	14	200	75	40	35	35	30	415
Patrick Coghlan ..	Ditto	8 0 0	4 0 0	4 15 0	5 0 0	3 0 0	1 ass	1	1	..	7	2	60	200	65	40	40	40	40	425
Richard Lincoln ..	Mr. Bagge	2 2 0	3 0 0	2 0 0	2 0 0	0 2 0	..	1	1	1	6	1	50	210	80	30	30	25	42	417
John Foley	Lord Stuart	18 0 0	2 7 0	6 10 0	4 0 0	14 0 0	1	2	1	..	16	3	66	195	55	28	35	28	30	371
Widow Mulcahy	Sir R. Paul	2 0 0	2 0 0	..	2 0 0	..	1	..	..	..	..	2	24	200	25	35	35	25	35	355
Catherine Foley ..	Lord Stuart	13 0 0	2 7 0	5 10 0	9 0 0	4 0 0	1	2	1	..	3	..	25	170	60	20	20	42	40	352
Patrick Foley ..	Mr. O'Dell	6 0 0	6 5 0	4 5 0	4 2 0	1 2 0	1	..	..	..	2	2	30	190	35	30	25	25	28	333
Thomas Lynch ..	Ditto	3 0 0	2 10 0	..	3 0 0	..	2	..	[illegible]	..	4	1	25	200	40	10	32	30	20	332
Richard Carey ..	Mr. Smith	3 0 0	12 5 0	..	3 0 0	..	1	2	..	..	..	..	10	165	60	15	20	25	40	325
Patrick Brien ..	Mr. O'Dell	2 0 0	4 0 0	2 0 0	2 0 0	..	1	..	..	..	..	1	18	180	20	35	35	10	38	318
John O'Leary ..	Lord Stuart	9 2 0	1 1 0	..	2 2 0	7 0 0	1	..	..	..	3	2	25	205	35	15	15	22	25	317
John Harty	Mr. O'Dell	4 0 0	8 0 0	..	3 2 0	0 2 0	1	..	..	..	2	4	27	160	25	35	38	25	32	315
Widow Troy ..	Mr. Bagge	3 2 0	5 0 0	6 15 0	..	3 2 0	1	3	..	1	..	..	20	100	65	35	35	25	45	305
Patrick Ross ..	Sir R. Paul	2 1 0	3 17 0	..	2 1 0	..	..	..	..	..	2	..	35	150	15	25	30	15	42	277
Peter Cuddy ..	Mr. O'Dell	3 2 0	6 0 0	..	3 2 0	..	1	..	..	..	..	2	20	150	20	15	32	25	30	272
Maurice Fitzgerald	Ditto	6 2 0	6 10 0	5 5 0	5 0 0	1 2 0	1	..	..	..	2	..	22	180	25	5	25	20	15	270
Declan Connors ..	Ditto	14 0 0	9 0 0	8 15 0	4 0 0	10 0 0	..	..	..	..	5	..	26	160	15	20	15	40	20	270
Patrick Gorman ..	Mr. Harty	1 2 0	3 0 0	..	1 2 0	..	..	..	..	..	4	1	26	150	20	10	30	30	25	265
James Burke ..	Mr. Bartlett	4 0 0	6 0 0	4 10 0	4 0 0	..	1	..	..	..	3	1	29	160	40	10	20	10	20	260
James Flynn ..	Sir H. P. F. Barron	7 0 0	7 7 0	3 5 0	1 2 0	5 2 0	1	1	1	..	15	..	30	120	25	30	10	25	40	250

bear testimony to the enormous amount of labour expended by the occupiers on the reclamation of the upland. There is equally strong evidence of the amount of labour expended on the bog-land, which in its original or natural state was not worth 1*s.* an acre for agricultural purposes, and a great deal of which, in its present condition, pays 1*l.* an acre. All this has been accomplished by spade labour, the farms being too small, the upland too stony, and the bogs too soft, for horse-labour. With the exception of a few farms which lie along the public road, the farms I visited are approachable either by bridle-roads, on which a wheeled vehicle of any kind cannot travel, or by pathways.

It will be seen from the tabular return (Table III., pp. 426, 427) that the four persons who head the list are equal in merit. I give the premier place to John Jordan, of Crenane, to whom I have referred already. He lives within 1½ mile of Ballaghaderrin. His farm is approached by a wretched "bohreen." He holds 19 acres 2 roods from Lord Dillon. The present rent (7*l.* 19*s.* 4*d.*), which was fixed eighteen years ago, when the land was "striped," must be regarded as a fair measure of its value at the time. There are about 8 acres of upland, and 11½ acres reclaimed bog. At my first inspection in 1872, part of the bog was in a rough state. The whole of it is now bearing crops. It is divided into twelve sections, which are separated by open drains, and connected by temporary bridges thrown across the drains at the angles. The drainage-water finds its way into a river which flows through the bog, and bounds the farm on the north side. Two years ago the river was deepened by Jordan and his brother, but as the work benefits a great many neighbouring farms, Mr. Strickland, on the part of Lord Dillon, paid them for it. Two of the sections adjacent to the river are now in permanent grass. Of five other sections, also in grass, two were top-dressed with clay at the time of my visit. Two sections were cropped with potatoes in 1876; one, the largest, was under oats, with which the seed of Italian rye-grass was sown; one was in lea oats; and one, also a large one, was cropped with mangels and turnips.

The roadway separates the bog-land from the upland. The house and offices are on the upland, which was cropped as follows:—

	A.	R.	P.
Garden	0	1	10
Paddock, which bore a luxuriant crop of "forced" grasses chiefly Italian rye-grass	0	2	0
Potatoes	2	0	0
Oats with grass-seeds	1	2	20
Pasture	3	2	20

A plot of the artificial grass contains a large proportion of clover, which Mr. Jordan finds better for "soiling" than either rye-grass or clover alone. His potatoes are very free from disease, and are the produce of seedlings raised by himself. The garden is divided into six squares, and is managed with great skill. All the ordinary vegetables are raised. There are several fruit-trees, and a plot at the back of the house is devoted to flowers. A large quantity of vegetables is sold. The return from the garden is fully 10*l.* a year.

The farm is now capable of carrying more stock than when I first saw it. At present there are 4 cows, 2 year-and-a-half old heifers, 2 weanlings, 4 pigs, 75 poultry, and 1 donkey.

I give an estimate of the return from the farm in 1876:—

			£.	*s.*	*d.*
Dairy produce:—					
Butter sold			22	8	6
Value of milk and butter consumed by family			10	0	0
Value of weanlings reared			9	0	0
1 calf sold			0	5	0
1 heifer sold			5	0	0
1 cow, whose place in the dairy has been supplied by one of last year's heifers			12	0	0
Notwithstanding these sales, the value of the stock on hand at the close of the year was rather more than it was at the beginning.					
Oats (deducting seed), 25½ barrels, at 12*s.*			15	6	0
Return from 4 pigs:—					
Actual receipts		17*l.* 0*s.* 0*d.*			
Cost of pigs	4*l.* 4*s.* 0*d.*				
½ cwt. Indian meal each,		5*l.* 0*s.* 0*d.*			
= 2 cwt., at 8*s.*	0*l.* 16*s.* 0*d.*		12	0	0
Potatoes, close on 3 statute acres, for use by the family or for sale, 12 tons, at 3*l.* 10*s.* per ton			42	0	0
Eggs and poultry, a low estimate			10	0	0
Garden, a very low estimate			8	0	0
			145	19	6

If from the gross return we deduct rent and taxes, cost of seeds, and other necessary articles, the balance represents what was available for the wants of the family. Every practical man will admit that the case has been understated; yet there would remain a net income of about 120*l.* a year to recoup Jordan and his brother for their labour and skill; and this result has been achieved on a small farm, two-thirds of which have been reclaimed from a state of absolute sterility, by a very unpretending man in a remote part of Connaught. The improvements on Jordan's house and offices have kept pace with the improvement of his land.

The next place on the prize sheet is assigned to Charles Sampey, who holds about 9 statute acres of arable land, and a piece of turf-bog from Lord De Freyne, at a rent of 3*l.*, which may be assumed to have been the fair letting value of the land

TABLE III.—RESULTS of the SPENCER PRIZE COMPETITION in the LOUGHGLYNN DISTRICT, 1876.

NAME OF COMPETITORS.	LANDLORD.	Extent of Holding Statute Measure.	Yearly Rent.	Poor-Law Valuation.	Area under Tillage	Area in Pasture,	Live Stock kept.							Marks Given.						
														Maximum						
														300	100	50	50	50	50	600
							Draught Animals.	Cows	Heifers or Bullocks.	Calves.	Sheep.	Pigs.	Poultry.	Farm Culture.	Live Stock.	Farm Offices.	Manure.	Garden.	Dwelling.	Total.
		A R P.	£ s d	£ s d	A R. P.	A. R. P.														
John Jordan ..	Lord Dillon ..	19 2 0	7 19 4	6 0 0	12 0 0	7 2 0	1 ass	4	2	2	..	4	75	270	90	42	35	48	40	525
Charles Sampey ..	Lord De Freyne	8 2 0	3 0 0	3 10 0	5 2 0	3 0 0	..	2	1	1	..	4	20	270	85	45	40	45	40	525
John Kearns ..	Mrs. Gibbons	10 0 0	6 8 0	5 0 0	5 1 20	5 2 20	1	3	1	2	..	3	50	280	80	30	45	45	45	525
Michael McDermott	Lord Dillon ..	19 0 0	10 10 0	7 15 0	5 2 0	13 2 0	1 ass	3	3	2	3	2	60	265	85	45	48	40	42	525
Peter Crawley ..	Ditto ..	9 1 0	4 16 0	5 15 0	2 3 0	6 2 0	..	3	1	2	..	2	50	260	90	40	40	45	38	513
Dominick Roddy	Ditto .	10 3 0	2 8 8	2 0 0	7 3 0	3 0 0	1 ass	2	1	1	..	..	40	265	70	38	48	45	38	504
Widow Duffy ..	Ditto ..	11 3 0	4 10 0	3 13 0	6 1 0	5 2 0	..	3	2	2	..	2	60	245	75	42	50	40	40	492
Pat Rush	Ditto ..	13 0 0	2 15 0	2 10 0	9 0 0	4 0 0	1 ass	3	3	1	..	2	60	255	75	40	45	30	35	480
Laurence Friehill	Lord De Freyne	4 0 27	2 4 8	1 15 0	3 0 0	1 0 27	..	1	..	..	..	1 Sow and 10 young	16	250	85	42	40	30	30	477
Michael Higgins..	Lord Dillon ..	14 0 0	4 1 1	Not known	7 2 10	6 1 30	..	3	1	1	2	2	40	240	75	42	50	25	40	472
Michael Sheehan	Ditto	12 0 0	6 0 0	4 15 0	5 3 0	6 1 0	1 jennet	3	2	2	3	3	50	235	75	40	40	30	35	455

John Gilligan ..	Ditto	24	0	0	7	6	0	7	5	0	10	0	0	14	0	0	1 jennet	2	..	..	..	..	..	215	75	40	40	45	40	455
John Heyden ..	Ditto	14	0	0	7	17	0	5	15	0	8	2	0	5	2	0	..	2	1	..	..	2	30	220	75	40	48	25	40	448
John Talbot ..	Mrs. Gibbons	9	0	0	5	5	6	4	0	0	6	1	0	2	3	0	1 ass	2	1	1	2	2	40	245	70	35	40	25	32	447
John O'Byrne ..	Lord De Freyne	17	1	0	5	6	0	6	5	0	10	1	0	7	0	0	..	3	2	2	..	2 Sows and 2 Stores	..	250	75	35	30	25	32	447
Andrew Hauly ..	Lord Dillon ..	19	0	0	9	9	0	7	7	0	7	0	0	12	0	0	..	4	3	2	..	2	50	230	80	32	36	25	42	445
Michael Horan ..	Ditto	20	0	0	10	6	0	10	15	0	15	0	0	5	0	0	1 ass	2	2	1	5 Sheep and 1 Goat	3	40	210	70	35	45	45	35	440
William Scally ..	Ditto	9	2	0	4	2	8	5	0	0	4	1	0	5	1	0	..	2	1	1	..	2	20	250	70	30	35	25	30	440
Michael Friehill ..	Ditto	11	0	0	5	18	6	4	10	0	7	1	20	3	2	20	1 ass	3	1	..	4	2	40	220	80	40	32	30	25	437
John Kelly	Ditto	6	2	0	4	10	0	5	0	0	5	0	0	1	2	0	..	2	1	1	3	2	20	220	75	30	30	45	35	435
John Flatley ..	Mrs. Gibbons	7	0	0	4	12	0	3	10	0	4	0	30	2	3	10	3 asses	3	1	1	4	2	40	225	75	35	40	25	32	432
John Rush	Lord Dillon ..	13	1	0	3	2	0	2	10	0	5	3	0	7	2	0	1 ass	3	1	2	..	20	40	220	80	30	35	28	35	428
Martin O'Donnell	Ditto	8	0	0	1	14	0	1	18	0	5	2	0	2	2	0	1	1	2	..	..	1	20	220	70	25	35	40	30	420
John Higgins ..	Ditto	16	3	0	6	1	0	6	0	0	5	3	20	10	3	20	1 mule	2	1	..	2	2	30	240	65	35	25	28	25	418
Widow Brady ..	Ditto	6	2	0	4	13	0	Not known			3	2	0	3	0	0	..	2	1	2	5	2	30	230	80	25	32	25	25	417
Stephen Kelly ..	Ditto	10	0	0	5	16	0	5	13	0	6	0	0	4	0	0	1	2	2	1	..	2	60	210	70	30	30	40	35	415
Thomas Conway	O'Conor Don, M.P.	5	2	0	1	10	0	Not known			3	2	0	2	0	0	1 ass	1	1	..	..	2	100	230	65	30	30	25	35	415
Dominick Finan ..	Ditto	5	3	30	1	5	0	1	5	0	4	2	30	1	1	0	..	2	..	1	..	4	40	230	70	25	30	25	25	405
Thomas Molony ..	Lord Dillon .	9	0	0	4	19	8	4	0	0	2	0	0	7	0	0	..	2	1	1	2	2	26	200	65	38	28	40	32	403
Martin Kelly ..	Mr. Sandford ..	13	0	0	6	0	0	5	15	0	6	3	20	6	0	20	1 ass	2	1	1	..	3	60	220	75	20	35	28	25	403
Martin Tarpey ..	Lord Dillon ..	16	0	0	9	14	0	8	15	0	4	2	0	11	2	0	1	2	..	2	..	3	40	180	80	38	32	30	32	392

when it was "striped," about twenty years ago. The farm is a strip, one field in width, bounded on the south by a rivulet, and on the north by a turf-bog. In 1872 the management of the farm was far in advance of that of any neighbouring farm. That there were then manifest defects, however, is evidenced by the fact that Sampey obtained only 365 marks out of a total of 600. Sundry improvements have been effected since. Three fields have been broken up and enriched; and of these two have been relaid down to grass. In 1876 a field of coarse pasture was tilled and manured; and now the entire farm is under a judicious system of "convertible" husbandry, and presents a creditable appearance. In common with the parctice of a vast majority of the small farmers of the district, the cows used to be housed in the end of the dwelling. In 1876 a very suitable cowhouse, 16 feet by 14 feet, was erected, at an outlay in cash of 5*l*., together with the labour of Sampey and his son in attending tradesmen.

The offices now consist of a barn, piggery, cowhouse, and poultry-house.

The manure-heap, too, used to be close to the door. In 1876 it was removed to the rear of a yard which was inclosed, and which will be further improved. This year the end of the house hitherto occupied by cows is to be cut off by a partition, and subdivided into a dairy and small bedroom. With an additional slight improvement, Sampey's farm will then be as well managed as any man could reasonably expect.

The garden is smaller than Jordan's. In 1876 it was admirably cropped.

The farm is divided into six fields and a paddock, which in 1876 bore the following crops:—

	A.	R.	P.	A.	R.	P.
Manured crops: Potatoes and Turnips				2	3	0
Oats on lea	1	2	20	1	3	30
Oats with grass-seeds	0	1	10			
Old grass pastured	1	2	0	3	2	0
,, meadowed	2	0	0			
Paddock grazed				0	2	0
Garden				0	0	30
House, yards, offices, &c.				0	0	30
Total				9	0	10

There is also a turf-bank, which supplies fuel.

From data already given, the income from this little farm may be estimated. I would gladly go into the figures were I not afraid of making this paper too long. It is enough for me to say, that while a large family has been reared, Sampey has been able to save money.

The present fertility of the land may be said to have been the creation of his labour. Five feet of turf have been taken away from the entire surface, including the site of the house and offices. And all this has been effected in a backward district by one of the most unassuming of men, whose house is a quarter of a mile from the public road, and is approached by neither roadway nor "bohreen," but through fields and over ditches. It must be admitted that the Spencer system has conferred incalculable benefits on Sampey; and to it belongs the merit of having raised him to the rank of a model farmer.

I am glad to be able to say that his immediate neighbour has made several improvements in his holding since I first saw it in 1872.

John Kearns is third on the list. He holds 11 statute acres from Mrs. Gibbons, at a rent of 6*l.* 8*s.* He saved some money out of his earnings in England as a labourer, and paid a fine for this farm in 1870. He has since built a good slate house, and converted the old farm residence into temporary offices, which will soon be replaced by a new set.

The approach to this farm is too narrow for carts; but it has been greatly improved by Kearns.

A good garden has been inclosed.

I first visited this farm in 1874, and found it in a very fair condition. One "bottom" field was yielding very coarse herbage. At my suggestion it was drained, broken up, and manured in 1875, and sown with corn and grass-seeds in 1876. It has now an improved appearance, and so has the entire farm.

Last year the under-agent of the estate visited the farm. More recently Kearns has obtained an appointment on the estate.

Michael McDermott, of Cloonaf, holds 19 statute acres, close to the town of Ballaghaderrin; and is one of the most prosperous small farmers in the entire district. He held under a middle-man until very lately, at a rent of 12*l.* a year; but the lease having expired, Lord Dillon reduced the rent to 10*l.* 10*s.*

There are about 9 acres of bog-land, of which one acre is retained for fuel, and eight are cropped as follows:—

	A.	R.	P.
Potatoes	2	0	0
Oats with grass-seeds	0	3	0
Oats alone	1	1	0
Artificial grass	1	0	0
Permanent pasture	3	0	0
	8	0	0

All the upland is in permanent pasture, except half-an-acre, which is occupied by the garden, house, and offices.

The stock on hand at the time of my inspection was 3 cows, 3 year-and-a-half-old heifers, 2 weanlings, 3 sheep, 2 sows, 60 poultry, and a donkey. Being a good judge of cattle, this man deals in "springers" during summer.

His income in 1876 was something like the following:—

	£	*s.*	*d.*
5 firkins of butter of 6½ stones each, and at 17*s.* a stone	27	12	6
Milk and butter consumed by family	10	0	0
Increased value of the 3 year-and-a-half-old heifers ..	12	0	0
2 weanlings	7	0	0
15 young pigs, at 1*l.* each	15	0	0
2 fattened, less cost of purchased food	7	5	0
Eggs and poultry	12	0	0
Potatoes for family use (diseased and small ones being used by the cows and pigs), 6½ tons, at 3*l.* 10*s.* a ton	22	15	0
The oat-crop is given in sheaf to the cows		..	
About 15 cows were changed at periods varying from a week to six weeks, at an average profit of 1*l.* 5*s.* each	18	15	0
	132	7	6

From this should be deducted the rent and a sum of 11*l.* 5*s.* 6*d.* paid for grazing, as well as the few incidental expenses that a farmer of this class incurs. The remainder will be the reward of his own labour and skill, and of such assistance as he gets from his family.

The conditions of this man's land and the appearance of his house testify to his prosperity. There is in the family every indication of happiness. I asked him why he did not compete for the Spencer prizes until 1876; and he replied by saying that he did not wish to try until he would be sure of getting a good place. The improvements effected in the land and offices during the past two years confirm this statement. Thus we see how a man who has been unusually successful comes to be stimulated to further exertions by a prize system in which he has confidence.

Of all the competitors, Thomas Conway of Clonrea, to whom a brief allusion has been already made, deserves the most credit. In 1873 he scored only 260 marks, of which 200 were for the land. I give the marks in the several sections in that year and in 1876:—

	1873.	1876.
1. The cultivation of the soil	200	230
2. Live-stock	5	65
3. Farm-offices	10	30
4. Management of manure	25	30
5. Garden	10	20
6. Dwelling	10	35
	260	410

His holding now consists of 5½ acres of reclaimed bog, and of a tract of the bog in its original or natural state.

When he got into possession, an acre and a rood of the bog had been reclaimed; and the rent at the time appears to have been fixed by putting 1*l.* on the reclaimed part of the farm, the unreclaimed part having been given free. The rent has not been raised since. The moral security of tenure which has prevailed on the estate induced him to reclaim, piece by piece, 4¼ acres of the bog at a heavy application of his own labour. He divided it into squares by cutting deep open drains. He dug a large quantity of clay from the subsoil of the cut-away bog, and applied it to the surface of the peaty soil.

He made a pathway, or what he calls a road, by putting a layer of branches of trees and bogwood on the bog. In reclaiming the bog he cropped it first with potatoes, and, as a rule, the second crop was also potatoes; after which it was sown with oats and seeds, or oats alone, according to circumstances. He thus literally created a fertile soil on the top of 20 feet of bog.

At the time of my visit in 1873 he had neither a cow nor a heifer. He has now a suitable cow, and a heifer 18 months old.

In 1873 his dwelling was in a wretched state, one end of it being used for a cow when he was able to keep one. There were no farm offices, except a rude piggery. He has been improving ever since, and now there is a suitable cowhouse which was erected in 1876, and which is built of stone walls and a wooden roof. A piggery has been built at the end of it.

The part of the kitchen which used to be occupied by the cow has been separated by a nice wooden partition, and used as a dairy or store as required. A new chimney has also been put into the house.

The crops last year were:—

	A.	R.	P.
Potatoes	1	2	20
Turnips	0	1	0
Oats	1	2	20
Grass	2	0	0
Total	5	2	0

		£	s.	d.
The oat-crop is given to the fowls, of which about 100 are kept; and the return from which in the twelve months was		21	12	0
(I do not take into account the eggs used by the family.)				
2 pigs sold for	12*l.* 0*s.* 0*d.*	9	4	0
Cost .. .. 2*l.* 0*s.* 0*d.* Indian meal .. .. 16*s.* 0*d.*	2*l.* 16*s.* 0*d.*			
Milk and butter from the cow, say		10	0	0
Carried forward		40	16	0

	£	s.	d.
Brought forward	40	16	0
1 calf sold	0	6	0
Increased value of heifer	4	0	0
Value of potatoes consumed by the family, say 4 tons, at 3*l.* 10*s.*	14	0	0
Earnings elsewhere as a labourer	6	0	0
	65	2	0

It may be said that this man would have been happier as a mechanic or as a well-paid labourer in England than he has been in this holding of bogland. As this paper is intended to describe the effects of an attempt made to improve the condition of the small farmers who now occupy so large a portion of the land of Ireland, I feel that my duty is to narrate facts rather than discuss theories. I cannot, however, forbear remarking that a small farm, always assuming it is not too small, provides for sickness and old age in a very different way from the savings of a mechanic or labourer.

It will also be said, perhaps, that it might be better for this man's offspring if he and his wife had settled on a tract of free ground in some foreign land. With this aspect of his case I am not concerned. He has chosen to settle where he now lives.

Lord Spencer, evidently regarding him as an existing unit in society, would wish to make him more useful to himself and to society. The man previously barely possessed the necessaries of subsistence. He is now in a fair way of enjoying for the future the necessary comforts of life according to the standard of his class. The improvements he has made have increased his income; and they have not only raised him in the estimation of his neighbours, but added to his self-respect. His landlord has a pecuniary interest in his improved condition, arising out of the law of progress, to which attention has been already directed, and he can derive a higher satisfaction from every case of the kind, owing to the improvement in the aspect of society towards which it tends. It is needless to say that the progress of agriculture among this and every other class benefits the trading and commercial classes of society. It increases the demand for seeds, manures, groceries, and all the wants of life. Every improvement in the circumstances of Thomas Conway, and of every man who produces wealth, increases even the receipts of Her Majesty's Treasury, by increasing the consumption of articles on which duties are paid.

The example of Conway, the way he was dealt with by the O'Conor Don, M.P., and the general feeling created in the district, has had a beneficial effect on his neighbour, Dominick Finan, to whose management in 1873 it was deemed unnecessary to attach any marks; but who obtained a total of 405 marks in 1876. On the day of my visit this man was actively engaged digging "clay" from the subsoil and carrying it over his bogland. Another neighbour, Martin Kelly, who holds under Mr. Sandford, D.L., scored 403 marks, and, by carrying out a few improvements suggested to him, he would come out very high at any future competition.

As this paper would run to an inconvenient length if I dwelt on each of the competitors who made any improvement during the year, I must conclude with a few general observations on the remaining parts of the district.

I refer first to Driney, which is not far from Loughglynn, and in which five of the competitors live: namely, William Lally, who scored 440 marks, and ranked eighth; Michael Horan, who scored the same number of marks; John Kelly, who ranked ninth, and scored 435 marks; and Stephen Kelly, who scored 415 marks.

Lally is a young man who, single-handed, has effected a great deal of drainage, and who promises to become one of the best men in the district. In 1873 the farms of the Kellys and of Horan were so indifferently managed, that we deemed it unnecessary to give them any marks. In 1876 the land was remarkably clean and well cropped.

I would next refer to several farms in the neighbourhood of Kilmovee, in which, as already explained, the upland was originally rough and stony. This is indeed the land of small farms. It would have ruined large or capitalist farmers to make the improvements which these people have effected by their own labour. This work is still going on. I give one instance—that of Michael Higgins—who has lifted huge stones, which, standing on their ends, looked at a distance like tombstones in a graveyard. This man's house and offices do him great credit. I gave him full marks for the large quantity of well-made manure he had. One of the best-managed farms I have visited is that of Dominick Roddy, whose son is the most likely man in the entire Spencer circuit to advance to the front. This man scored 504 marks, and obtained the sixth place. The widow Duffy came next to him, with 492 marks. She was closely followed by Pat Rush, who scored 472 marks. A description of the holding of either of these would be as interesting as any I have already given.

Finally, I would refer to John Talbot, of Rathnacassan, who holds 8 acres 3 roods from Mrs. Gibbons, at 5*l.* 5*s.* The farm is approached by a bridle-road, which is as hilly as it is uneven. There are 5½ acres of upland in very good condition, and the rest is reclaimed bog, separated from which by a simple boundary the natural bog, in its original state, can still be seen. This man appeared in 1876 for the first time among the competitors.

Seeing so much merit, I asked him why he had not competed before; and his reply was that, as soon as he heard of the system, he determined to work for a prize. The influence it has had in stimulating him may be understood, when I state that in 1876 the cows were expelled from the dwelling, and a suitable byre fitted up for them; that a good chimney was put into the house; and that a wall was built cutting off the manure-heap from the front of the door.

Since the foregoing statement was sent to press I have learned, with great satisfaction, that the Irish Peasantry Society have expressed a desire to continue the Spencer Prize System. Their subscription could possibly be made the nucleus of a fund for carrying out the system on a comprehensive plan. Unless I am much mistaken, a large number of the gentry, clergy, and other classes would gladly co-operate in promoting a system so eminently calculated to advance the national interests of the country.

XXI.—*Clover Seed and its Impurities.* By WILLIAM CARRUTHERS, F.R.S., Consulting Botanist to the Society.

THE legislation of 1869 included one bill of great value to the agriculturist. Mr. Welby's Seed Bill, passed in that year, made criminal the wilful and fraudulent practice of preparing seed, that was previously in operation to the ruin of the farmer's crops. As an immediate result, the manufactories that were known to exist for the purpose of "doctoring" seeds were closed, and it is a fact that killed and dyed seeds have almost if not altogether disappeared. Only two suspicious cases have come within my observation during the past five years, but in them the evidence of intentional adulteration on the part of the vendors was not complete. The action taken in relation to both these cases led, I believe, the parties implicated to observe greater care in regard to the character of the seed they have since offered for sale.

Mr. Welby's bill did not attempt to regulate the seed-trade in all its details, as, indeed, would have been impossible; so that even now, although not to the same extent as formerly, the agriculturist who does not grow his own seed is at the mercy of the dealer. Killed and dyed seeds are gone, but dead seeds may still be there, viz., seeds that have been carried over from former years, and that have, from natural causes, lost their power of germination, as well as seeds of the previous harvest that have not been fully ripened, or that have been injured in the process of harvesting.

It might seem to be a matter of regret that Mr. Welby did not include in his bill some clauses by which the intermixture of old seed with that which was the produce of the previous harvest could have been prevented. But legislation in this direction would have been most undesirable, and would, indeed, have been very prejudicial to the true interests of the grower. For, in the first place, though a seed cannot live always, its life may persist for several years. The protective covering with which every seed is provided preserves the minute embryo plant from injury through the action of external agents. The varying conditions under which, in nature, seeds have to pass the dormant period of their existence, are met by the different and suitable structures of their respective protective coverings. In clover the seed-coverings are efficient for protecting the seed-plant for a considerable time when it does not encounter unfavourable conditions; so that clover-seed, if it has been well ripened and well harvested, may be kept without injury for one or even for several years.

Then, further, it is most undesirable in the interest of the agriculturist to prevent a reasonable carrying forward of old seed; for it would otherwise be impossible to meet his requirements in the event, which is not infrequent in our changeable climate, of having a bad seed-harvest. At the best the harvesting of seed is with us precarious. A bad year does not supply sufficient good seed for the next year's needs. The power must then be permitted of carrying forward old seed, and when this is done judiciously no injury can result to the grower. As the better class of seed-dealers are also seed-growers, they have the power of carrying on this necessary (as I venture to call it) part of their work intelligently. In the hands, therefore, of respectable and honourable dealers, the farmer who is dependent on purchased seed has nothing to fear from this cause.

But there are, as has been stated, seeds from the immediately preceding harvest that are of no value to the agriculturist. These may be (1) seeds that have been so broken or bruised in threshing that they are incapable of germination. All samples of clover-seed necessarily contain more or less of such injured seeds. There may be (2) seeds that have been imperfectly ripened, and that present consequently a compressed, shrunk, and wrinkled appearance. Such seeds are not likely to germinate at all, or, if they do germinate, they produce, from the want of suitable nourishment, weak plants which are unable to establish themselves in the soil. Yet further, such valueless seeds may be (3) structurally perfect seeds, but their protective covering may be so indurated as to resist the entrance of the water necessary for germination, and they may consequently remain hard and unchanged in the ground. Under favourable conditions the seeds of clover germinate rapidly, but such "hard" seeds may remain for weeks or months without germination, and some may never germinate at all. In all clover-seed a small proportion of such "hard" seeds are always to be found.

It must, then, be obvious that a certain amount of failure in clover-seed is due to causes which are either natural or of such a character that no one can be blamed for them; yet careful treatment will reduce the number of broken and injured seeds, and due respect to the condition of the crop at the time of harvest will reduce the number of imperfect seeds. It is, however, impossible to distinguish, except by the test of germination, what individual seeds have coverings that will resist the entrance of water.

The clovers generally cultivated belong to four species, viz. *Trifolium pratense*, Linn.; *T. medium*, Linn.; *T. repens*, Linn.; and *T. hybridum*, Linn.

Trifolium pratense, Linn., or Common Red Clover (Fig. 1), is perhaps the most valuable of the clovers. It is a perennial plant, lasting for a few years. It has a hard, almost woody root, a stem about a foot high, and oval leaflets, often with a horseshoe mark in their centre. The whole plant is slightly hairy. The large globular heads of red flowers rest on a pair of leaves. The pod contains a single largish seed, which, in our English-grown specimens, is of a decided purple colour.

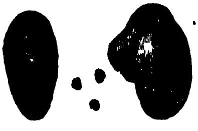

Fig. 1. *Trifolium pratense*, Linn
Common Red Clover.

Trifolium medium, Linn., or Perennial Red Clover or Cow-grass (Fig. 2), is a perennial plant with a somewhat creeping root and a zigzag stem. The leaflets are narrower than in the common red clover, and are generally without the horseshoe mark. The heads of flowers are bright red, and are on a stalk which rises some distance above the leaves.

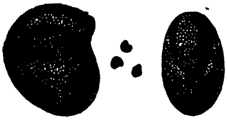

Fig 2 *Trifolium medium*, Linn. Cow-grass.

Trifolium repens, Linn., or White Dutch Clover (Fig. 3), is a low, smooth, perennial plant with a creeping stem, often more or less buried in the ground, and consequently root-like. The leaflets are obovate, and have frequently a horseshoe mark near the base. The globose white or pinkish-coloured heads are on long stalks springing from the axils of the leaves. The pod is longish, containing from four to six small seeds.

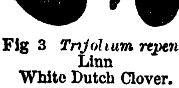

Fig 3 *Trifolium repens*, Linn
White Dutch Clover.

Trifolium hybridum, Linn. (Fig. 4), or Alsike, is a perennial smooth plant with flexuous hollow stems. The white or rose-coloured flowers are in loose globose heads on long stalks. The short pod contains two small dark seeds.

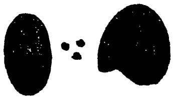
Fig 4 *Trifolium hybridum*, Linn. Alsike.

In addition to the dead and imperfect seeds which one finds in clover-seed, a number of other ingredients are met with, which are either valueless or actively injurious to the farmer. These impurities in the great majority of cases can easily be got rid of by careful winnowing and sifting, as they differ more or less from the seeds of the clover in weight and size. These operations require, of course, the exercise of great care and some labour with the seed; but even if the expense of this must be borne by the farmer in the shape of a small increase in the price of seed, the money would be well spent, and should not be grudged. It is impossible to estimate the injury the agriculturist does to himself, when, in saving a few shillings in spring by the purchase of a cheap seed, he secures at harvest a crop of clover not only poor in itself, but abundantly mixed with worthless weeds whose injury to his crops are not terminated when they are cut down with the clover. The buyer is surely entitled to make absence from injurious seeds an element in his purchase, for in buying dirty seed he not only pays for foreign seed at the same rate as for the clover, but he is acquiring material which may prove a serious injury to his crops for years to come.

It is not necessary here to enter into a general statement as to the evil of weeds, but it may be pointed out in a word or two that fast-growing weeds may smother and more or less injure the crop, and that every weed occupies the space and consumes the food provided for the crop as far as its influence extends, and that it is hopeless to attempt to rid clover of such impurities after the seed has been committed to the ground.

On this account it is very important that the cultivator should be able to determine whether the seed he has purchased is pure, and to detect what impurities are present in it. The remainder of this paper will be accordingly devoted to descriptions of the impurities most frequently found in clover, in the hope that these and the accompanying illustrations may supply the reader with the necessary information for the examination of his seeds.

Some of the seeds mixed with the special variety of the seed purchased are, of course, not injurious weeds; and when they do not form any considerable proportion of the seed, they can scarcely be regarded as diminishing to any appreciable extent its value. Thus it is very rare to procure one variety of cultivated clover without a certain admixture of one or more, and perhaps all, of the other cultivated species. The seeds of white clover are most frequently met with in other clover-seeds and in the largest quantity. But it is obviously a difficult matter to keep a field free from all but one species or variety, though careful seed-growers should endeavour to secure this.

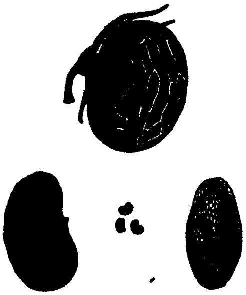
Fig. 5. *Medicago lupulina*, Linn. Black Medick.

Besides the seeds of other clovers, the seeds and sometimes the small black reticulated and single-seeded pods of *Medicago lupulina*, Linn., Black Medick, or Black Grass (Fig. 5), are found mixed with clover. This is a native British plant common in fields and waste places. It has a tapering fibrous root, a much-branched stem, clover-like leaves, and small yellow flowers in ovoid heads. It is an annual plant which flowers and fruits freely throughout the summer months.

Along with the clovers, as a harmless ingredient in some samples, may be placed the small oval seeds of *Phleum pratense*, Linn., or Timothy-grass (Fig. 6), which is a well-known excellent fodder-grass, an ingredient in all good permanent pasture.

Fig 6. *Phleum pratense*, Linn. Timothy-grass.

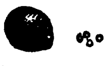
Fig. 7. *Cuscuta Trifolii*, Bab. Dodder.

The two weeds which are justly most dreaded by agriculturists are the two parasites which live on the vital juices of the clover. The one, the Dodder, pushes its suckers into the stems of the plant; while the other, the Broom-rape, attacks the root, and there obtains its prepared food. The Dodder (*Cuscuta Trifolii*, Bab.) (Fig. 7) is an annual plant, flowering in July and August. In germinating it pushes its small root-fibre into the soil, and sends up its wiry, leafless stem to lay hold of the clover. As soon as it has secured connection with the foster plant it withdraws from its connection with the ground, and maintains its whole life at the expense of the clover. Its slender reddish stem grows with wonderful rapidity, and often forms, at the expense of the clover, immense masses like small hay-cocks. The small white or pinkish flowers are produced in spherical heads at intervals along the stem. Its two seeds are contained in a small, roundish capsule. The seeds are small and flat, and of a pale-brown colour. They are so small that a careful sifting of the clover-seed easily separates them completely, so that there is no excuse for their presence in any sample. In a former Number of the 'Journal' (vol. ix., second series, p. 253) I described at length the structure and habits of this injurious parasite.

The Broom-rape (*Orobanche minor*, Sutt., Fig. 8) attaches itself to the roots of the clover, and sends up a slender, leafless stem from 6 to 24 inches high, which is at first of a yellowish purple colour, and becomes ultimately brown. The whitish flowers are followed by oblong capsules full of numerous minute seeds, with a thick pitted covering of a dark-brown, almost black, colour.

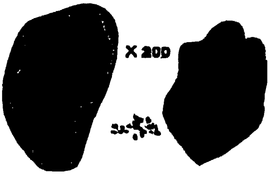

Fig. 8. *Orobanche minor*, Sutt.
Broom-rape.

The seeds of these two parasites are chiefly found in foreign samples. The Broom-rape has, in some years, been very destructive to the clover-crop in Holland. It has chiefly appeared in this country in the crops of Norfolk, Kent, and Surrey.

The longevity of the small seeds of Dodder and Broom-rape is remarkable. When ploughed into the ground they often remain in a living condition in the soil till a crop suitable for their support is grown in its course in the field. They then re-appear. Indeed, when in the course of cultivation the plough brings these seeds again to the surface, they may sometimes be found, in the absence of suitable plants, attacking other crops which it is not their nature to live upon, as in the case of the Dodder attacking a crop of turnips which came under my notice, and the same weed has been several times observed attacking wheat. These seeds retain the power of germination for at least four or five years when buried in the soil; for it has been observed that when the Dodder appeared on plants of clover in ley-wheat, it re-appeared when in due course the field was sown with clean clover. When, therefore, a growing crop is infested with either of these parasites, it is important that the cultivator should not plough them into his land, but ensure their complete destruction by burning them.

During this summer (1877) I found the Dodder abundant in clover fields around Herne Bay; and in one field the Broom-rape had appeared. I learned from the bailiff that he had not noticed this plant in previous years. Unaware of its nature, he had not interfered with its growth. He had noticed it in the first crop, though it was not at all abundant; but after cutting the clover the minute seeds, now fully ripe, were scattered and unexpectedly sown. The parasite reappeared in such quantity in the second crop that patches of the second crop were completely destroyed by it. The field, in places where the parasite occurred, was left almost bare of vegetation.

In further considering the impurities in samples of clover seed, it will be seen that they do not belong to a large number of families; and as the seeds of each family agree generally in form and other characters, it will be better to consider them in their systematic order.

Sometimes the little beaked fruits (achenes) of the Acrid Buttercup (*Ranunculus acris*, Linn.) are met with, and also the small pitted seeds of the common field Poppy (*Papaver Rhœas*, Linn., Fig. 9).

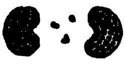
Fig 9. *Papaver Rhœas*, Linn. Poppy.

Amongst the few cruciferous plants mixed with clover-seed the most frequent are the seeds of the Penny Cress (*Thlaspi arvense*, Linn., Fig. 10). These seeds are dark, oblong, ridged, and punctate. The plant is a weed in fields, an annual, with a small tapering root, a slender stem, from one to two feet high, and white flowers, followed by a round, notched, and winged pod, containing about twelve seeds.

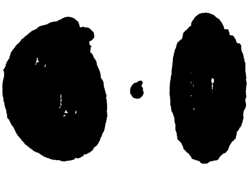
Fig 10. *Thlaspi arvense*, Linn. Penny Cress.

The ovate seeds of the Pansy or Heart's-ease (*Viola tricolor*, Linn., Fig. 11) are occasionally present in samples of clover. This annual, well known in pastures and banks, has small fibrous roots. It flowers all the summer through, producing its seeds in triangular capsules, the valves of which are elastic, and spring right back when they are ripe.

Fig. 11. *Viola tricolor*, Linn. Pansy.

The kidney-shaped seeds of several caryophyllaceous plants are common ingredients in clover. The most frequent are the small, pale, yellowish brown seeds of the Mouse-eared Chickweed (*Cerastium triviale*, Link, Fig. 12). They are rough, with elevated points on the outer edges. This plant is a small annual with a long, slender branched, fibrous root. It is in flower from April to August, and produces a large number of very small seeds. The seeds of the common Chickweed (*Stellaria media*, Linn., Fig. 13), are not infrequent. They are dark, dull brown, and rough, with lines of elevated points. The root of the plant is small and somewhat tapering. The seeds of Spurrey (*Spergula arvensis*, Linn., Fig. 14) also occur. They are small and round, but somewhat compressed like a doubly convex lens, smooth or tubercled, and

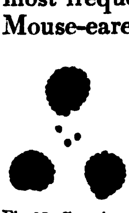
Fig 12. *Cerastium triviale*, Link Mouse-eared Chickweed

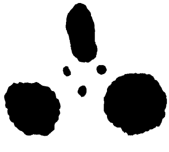
Fig. 13. *Stellaria media*, Linn. Chickweed.

surrounded by a pale membranous border. This plant has a small, tapering root, and a much-branched and spreading stem. It produces its small white flowers and elongated fruit-capsules from June to August. Each capsule contains a large number of small seeds. The seeds of the Catchfly (*Silene inflata*, Sm.) are also sometimes found; they resemble those of the Mouse-eared Chickweed, but are longer, and elegantly marked with lines of elevated points.

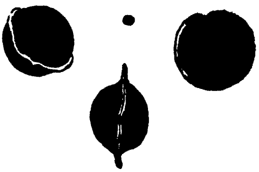
Fig. 14. *Spergula arvensis*, Linn Spurrey.

The seeds of Knawel (*Scleranthus annuus*, Linn., Fig. 15) are oval, compressed and smooth. This plant is a small annual, with a slender, tapering, branched root, a slender stem, bearing minute green flowers. It may be found in June and July in corn-fields and waste places.

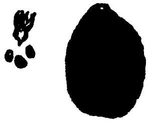
Fig. 15. *Scleranthus annuus*, Linn. Knawel.

The ovate, smooth, and even seeds of a Crane's-bill (*Geranium molle*, Linn., or *Geranium pusillum*, Linn., Fig. 16), are sometimes mixed with clover. These plants are found in pastures and waste places, and are in flower during the summer months. They have tapering roots, spreading stems swollen at the joints, and round lobed leaves.

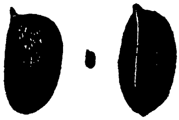
Fig 16. *Geranium pusillum*, Linn. Crane's-bill.

Occasionally the spiny seeds, or rather fruits, of the wild Carrot (*Daucus Carota*, Linn.) occur in considerable numbers in clover. This umbelliferous weed is common in pastures; it has a slender, tapering, yellowish root, and resembles the well-known cultivated plant.

The black, shagreened fruits of the white Bed-straw (*Galium Mollugo*, Linn.) are also met with, (Fig. 17). This plant is a common perennial found in the hedges of fields and in copses. It has a stem two to four feet high, with whorls of six or eight leaves, and clusters of white flowers.

Fig. 17. *Galium Mollugo*, Linn. White Bed-straw.

Sometimes in considerable quantity may be found the seeds of a Corn-salad (*Valerianella dentata*, Poll.)—a common weed in corn-fields (Fig. 18). It is a small annual with an erect branching stem and flesh-coloured flowers, which appear between June and August.

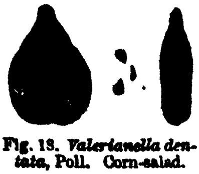
Fig. 18. *Valerianella dentata*, Poll. Corn-salad.

Of composite plants, one meets with the seeds, or rather fruits, of Knap-weed (*Cen-*

taurea nigra, Linn.), a grey shining fruit, crowned with a short pappus; of Nipplewort (*Lapsana communis*, Linn.), a pale-brown, slightly-compressed, curved, and striated fruit, without pappus; but chiefly of the Ox-eye Daisy (*Chrysanthemum Leucanthemum*, Linn.), a four-sided fruit, with white elevated ribs, and without pappus (Fig. 19). This is a perennial weed too common in meadows and waste places. It has a somewhat woody root, furnished with numerous long-branched fibres. The large compound flowers, with a yellow centre and white spreading tip, are abundant in June and July.

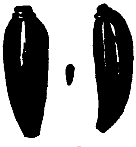
Fig. 19. *Chrysanthemum Leucanthemum*, Linn. Ox-eye Daisy.

Perhaps the most frequent foreign seed in clover is that of the Rib-grass (*Plantago lanceolata*, Linn.). The seeds are oblong, black, and shining, with the front surface concave and the other convex. (Fig. 20.) This perennial plant has a tapering, somewhat woody root, with numerous spreading fibres. It is thought to be a useful plant in some pastures, but it does not appear to be relished by cattle. The seeds of another Plantain (*Plantago media*, Linn.) are less frequently found (Fig. 21). They may be distinguished from those of the Rib-grass by the front of the seed being flat.

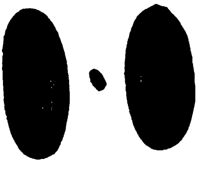
Fig. 20. *Plantago lanceolata*, Linn. Rib-grass.

The seeds of two Borragineous plants occur. The angular wrinkled nuts of the Viper's Bugloss (*Echium vulgare*, Linn.), a biennial plant, with a long tapering root, and with the stem and leaves rough with pale rigid bristles (Fig. 22). This is one of the most ornamental of our native plants, but it is valueless to the agriculturist. The seeds of Scorpion-grass (*Myosotis arvensis*, Hoffm.) are brown or black, with a keel in front (Fig. 23). The plant is a low annual, with fibrous roots, and branched stems with small pale-blue flowers, appearing in June, July, and August.

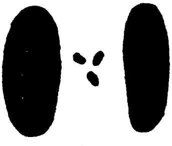
Fig 21. *Plantago media*, Linn. Plantain.

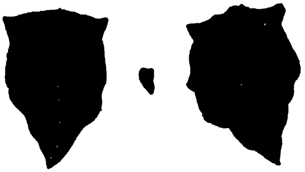
Fig. 22. *Echium vulgare*, Linn. Viper's Bugloss.

The oblong smooth nutlets of Self-heal (*Prunella vulgaris*, Linn., Fig. 24) are very frequently found in clover. They are about the same size as the larger seeds of clover, and are apt to be overlooked. The plant is a perennial, having roots of numerous long wiry fibres, and a single flowering stem; but it gives off creeping runners, by which it is multiplied as well as by the seed. The purplish, sometimes white, flowers are produced in dense terminal heads, surrounded by leaves. The flowers appear in summer and autumn, and the plant is common in pastures and waste places.

Fig. 23. *Myosotis arvensis*, Hoffm. Scorpion grass.

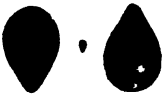

Fig. 24. *Prunella vulgaris*, Linn. Self-heal.

The small angular seeds of the Pimpernel, or Poor-man's Weather-glass (*Anagallis arvensis*, Linn., Fig. 25) are not uncommon. This is a familiar plant, deriving its common name from its closing its flowers on the approach of rain. It has a branched and spreading stem, with a small root of branched fibres. Its small red flowers are produced all through the summer, as well as the small pea-shaped capsule, which bursts transversely into two hemispheres and exposes a large number of small peltate seeds arranged round a central knob.

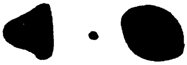

Fig 25 *Anagallis arvensis*, Linn. Pimpernel.

The seeds, or rather fruits, of the two Sorrels are often abundant in clover, and especially those of the Sheep's Sorrel (*Rumex Acetosella*, Linn.). The fruits are small and acutely triangled, and of a dark, shining, brown colour (Fig. 26). The plant is perennial, with a slender, fibrous, creeping root-stock. The stem is from three to twenty inches high; it flowers in summer, and after flowering the whole plant changes its colour into a deep red or crimson. The seeds of the Common Sorrel (*Rumex Acetosa*, Linn.) resemble those of the Sheep's Sorrel, except that they are more acutely pointed at the ends (Fig. 27).

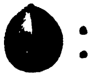

Fig 26. *Rumex Acetosella*, Linn. Sheep's Sorrel.

The small, roundish, somewhat kidney-shaped seeds of the white Goose-foot (*Chenopodium album*, Linn.) (Fig. 28) are also found in clover. They are almost black, smooth, shining, and very finely dotted; they are generally enclosed in a pale thin membrane. This is a very variable annual weed, with a branched fibrous root, and a stem from one to three feet high. The whole plant is covered with a white mealiness which gives to it a soft unctuous feel. It flowers in July, August, and September, and is common on cultivated grounds.

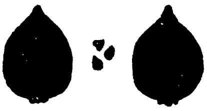

Fig 27. *Rumex Acetosa*, Linn. Common Sorrel.

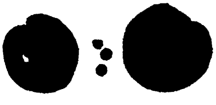

Fig. 28. *Chenopodium album*, Linn. Goose-foot.

The seeds now figured and described are all small. They require some care and experience in separating them. But an acquaintance with their forms, such as may be acquired from the study of the Drawings illustrating this Paper, and a little experience in examining, with the help of a pocket lens, will enable the buyer to estimate the quality of the seed offered to him, and to separate the impurities contained in it.

XXII.—*The International Dairy Exhibition at Hamburg,* 1877.

By H. M. Jenkins, F.G.S., Secretary of the Society.

Continental methods of farming present many contrasts to those generally practised in the British Islands, and the relative importance of dairying is one of the most striking. In the United Kingdom the manufacture of butter and cheese must be regarded as holding a secondary position in comparison with the production of meat, or even of milk for immediate consumption; but in the northern countries of Europe the efforts of the arable farmer are chiefly directed to supplying the raw material for what are termed "Agricultural Industries," meat-making being looked upon merely as the most profitable method of utilising the refuse of the dairy, the sugar-factory, the brewery, and the distillery.

Thus the arable farmer in Northern Europe sends his roots, if he grows any, to the sugar-factory, and his potatoes to the brewery; and he uses his artificial grass for grazing dairy-cows, while his permanent pasture is either mown to provide winter keep for his dairy-stock, or in certain favoured districts—such as the Marshes of Schleswig and Holstein—is summer-fed by fatting bullocks. "Stalled oxen" are chiefly to be found in the sheds attached to breweries, distilleries, and sugar-factories, and in the steadings of farmers who supply those establishments with their raw material, and receive back a percentage of the refuse substances. Exceptions must be made in favour of some of the most advanced and enterprising farmers who grow roots and feed cattle upon the English system; but in some districts the dryness of the climate in summer renders this a precarious practice.

The Dairy-show held last February in Hamburg was a much more important event than any Exhibition of that nature has hitherto been in England; and it seems reasonable that the cause should be found chiefly in the facts just stated. At the same time great credit must be given to the Committee who undertook the management of the Exhibition for the completeness of the arrangements which they made to ensure its success. The Exhibition was to be international, and they therefore sought the co-operation of foreign countries, by inviting the National Agricultural Societies to nominate a representative to act on their Executive Committee, to assist them with advice, and to act as a medium of communication with intending exhibitors. The Council of the Royal Agricultural Society of England therefore nominated the Hon. Wilbraham Egerton, M.P., who represents a pre-eminent dairy district, and he accepted the office on the invitation of the Council. Unfortunately, Mr. Egerton was unable to be present at the Exhibition, and I was selected to attend in his stead, and to write this brief Report upon its most striking features.

The trade of Hamburg is, doubtless, very large in many other kinds of produce than butter and cheese, but in those articles it is so extensive that the locality chosen for the Exhibition must be considered very appropriate, especially as the chief port of North Germany is geographically so near the great dairy districts of the North of Europe. It appears that Hamburg imports on the average 250,000 cwts. of butter per annum, of which the inhabitants consume from 50,000 to 60,000, leaving nearly 200,000 cwts. for exportation. About 60,000 cwts. of cheese are imported annually, and from 20,000 to 30,000 exported. The average value of the butter was calculated at 86*s.* per cwt. in 1875, and 120*s.* in 1874, the average of several years being about 100*s.*; the value of the cheese does not appear to fluctuate so much, and may be taken at 64*s.* per cwt. The total value of the imports of these articles varies between 1,250,000*l.* and 1,500,000*l.* sterling. If to these statements it is added that between 18,000 and 20,000 cows are required to supply the 500,000 inhabitants of Hamburg with milk, at a cost approaching 500,000*l.* sterling per annum, it will be realised that the town of Hamburg has a living interest in matters pertaining to the dairy.

The Exhibition was proposed in the first instance by the Dairy Association, which was established at Bremen in 1874, and the scheme, as originally drawn out, did not contemplate the offer of any prizes. On this point the prospectus stated—

> Every article exhibited will be subjected to the thorough scrutiny of appointed Jurors, as far as it is practicable, and the result of this examination will be made public, naming the number in the Catalogue.
>
> The Exhibitor will be allowed to make what use he likes of such Report.
>
> To every group at least three Jurors will be appointed.
>
> During the examination, the articles will be taken care of as much as possible.
>
> The verdicts of the Jurors will be published as speedily as possible.
>
> This professional judgment of all the articles exhibited is to take the place of the usual awarding of prizes, according to the rules of stipulated competition; however the Exhibition Committee reserve to themselves the privilege

of distributing prizes for especially prominent productions, or particular ability in promoting the interest of the dairy; the particulars of which will be afterwards published.

The Exhibition was divided into two great sections, one being devoted to milk and its products, and the other to machines and other aids to the preservation of milk and the manufacture of its products. In other words, in the latter section one found the means employed, and in the former the results obtained. Live-stock and natural feeding materials were excluded, but artificial foods were allotted a subsection. The two sections were subdivided as follows:—

SECTION I.—*Milk and Milk-products.*

Group 1.—Preserved and condensed milk.
Group 2.—Butter.
  A. Fresh butter for consumption in the neighbourhood of its manufacture.
    a. Salted.
    b. Unsalted.
  B. Keeping butter, suitable for shipment to distant places.
    a. Winter butter, old and new-milk butter in casks, and warranted to keep sweet at least four weeks.
    b. Summer (or grass) and autumn (or stubble) butter.
  C. Preserved butter, in tins, or otherwise packed for long keeping, or intended for that purpose.
  D. Whey butter.
  E. Melted butter.
  F. Artificial butter (admitted for comparison).
Group 3.—Cheese.
  A. Cheese from cows' milk.
    1. Skim-milk cheese.
      a. From milk skimmed after 12 hours' standing.
      b. From milk skimmed after standing more than 12 hours.
    2. Export cheese.
    3. German, Dutch Danish, English, French, Swiss, &c., cheese.
  B. Cheese from goats' milk.
  C. Cheese from sheep's milk.
Group 4.—Various milk-products (milk-sugar, milk-vinegar, &c.).

SECTION II.—*Implements and Auxiliary Materials used in the Dairy.*

Group 1.—Machines, implements, and utensils, for the carriage and keeping of milk, which are used in the dairy from the time of milking to the sale or consumption of milk or its produce.
Group 2.—Complete fittings for the dairy, collections of implements, and machines.
Group 3.—Auxiliary materials: as rennet and colouring-matters.
Group 4.—Cattle-food, exclusive of straw, hay, and grain.

Group 5.—Scientific articles.
- A. Scientific instruments.
- B. Models.
- C. Drawings, plans, descriptions, statistical works, &c.
- D. Means of instruction.

In the absence of the offer of prizes for the best articles entered in these several classes, the inducement to exhibitors must be sought in the chance of their finding new customers for their productions; and as this consideration is of little value to English farmers, who have already the best market at home, the fact that there were only about half-a-dozen exhibits of cheese and butter from the British Islands is easily accounted for. To Continental farmers, and especially to those living in countries where agriculture, and more particularly dairy-farming, is beginning to advance, the Exhibition afforded a grand opportunity of showing the dealers of Hamburg and other great towns in consuming countries the improved quality of their dairy produce. A short review of the Catalogue of the Exhibition will show how extensively the opportunity was seized, and what an effective organisation was brought to bear upon it in some of the more remote provinces. There were, in round numbers, nearly 700 entries of butter, 400 of cheese, and 600 of implements and other aids to the manufacture of dairy-products. Exhibitors were allowed to give, in addition to the description of their entries, a short sketch of their farm and farming; viz., nature of the soil and subsoil, number and breed of cows, summer and winter fodder, average yield of milk per cow, method of making the cheese or butter pursued on the farm. These short statements invested with interest samples of cheese and butter which otherwise would have had little attraction for anyone but a merchant or dealer. Again, several foreign states and some provinces of the German empire sent "National collections," and the list of the first detachment of these was usually preceded by a short sketch of the agriculture of the country or province, or a separate pamphlet was distributed *gratis* by the Commissioner in charge of the collection. That nothing should be wanting to enable the visitor to appreciate the Exhibition, the Catalogue was prefaced by a short memoir on the Hamburg trade in dairy products; and the Committee also issued a Handbook to the Dairy-farming of the several provinces of the German Empire.

Although no prizes were offered by the Committee, yet after the entries had been made, the German Emperor offered a work of art worth 300*l*. for whatever might be deemed most meritorious connected with the Exhibition. This offer led to several others, and the following is the list of Awards:—

Prizes.	*Awards.*
GENERAL.	
A Work of Art, value 300*l.*, offered by the German Emperor.	Count Schlieffen of Schlieffen burg, near Lalendorf.
A Silver Cup offered by the Grand Duke of Mecklenburg-Schwerin, for some distinguished achievement in Dairying.	Dr. W. Fleischmann of Raden, near Lalendorf.
Fifteen Pounds offered by the Royal Agricultural Society of Celle, for Dairy products.	Collection exhibited by Finland.
A box containing One Hundred Pounds offered by the Prussian Ministry of Agriculture, for the best achievement of an associated Dairy.	The milk-business of the Associated Farmers in Hamburg, of 1863.
A piece of Plate, value Five Pounds, offered by the Schleswig-Holstein Agricultural Society, for the best exhibit of Schleswig-Holstein Butter.	Inspector Lubbe of Sierhagen, near Neustadt.
FRESH BUTTER.	
A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Herr Strauss, Amtsrath, near Gross-Oschersleben.
A piece of Plate, value Ten Pounds, offered by the Hamburg ladies.	Herr Egan of Bernstein, Stein am Anger, Hungary.
Seven Pounds Ten Shillings offered by the Westphalian Agricultural Society.	Herr Rumsfeld of Betheln, near Gropau, Hanover.
KEEPING BUTTER.	
A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Herr Lubbe of Sierhagen, near Neustadt.
Twenty-five Pounds offered by the Altona Chamber of Commerce.	Herr Ankerjerne of Randers, Denmark.
Twelve Pounds Ten Shillings offered by the Hamburg Society for promoting useful and artistic industries.	Herr Radbruch of Warteburg, near Gettorf.
Ten Pounds offered by the Butter-merchants of Altona (Dairy not to exceed 100 cows).	Herr C. Viröger of Aarhuus, Denmark.
Ten Pounds offered by the same.	Messrs. Heinecken and Zooten of Amsterdam.
A piece of Plate, value Fifteen Pounds, offered by the Hamburg Hotel and Restaurant Keepers, for Stubble Butter.	Herr Wriedt of Güstorf, near Plön, Holstein.
PRESERVED BUTTER.	
A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Not awarded.
CHEESE.	
A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Count Schlieffen of Schlieffenburg, Mecklenburg.
Twelve Pounds Ten Shillings offered by the Hamburg Society for promoting useful and artistic industries.	Count Hamilton of Blomburg, Sweden.
Ten Pounds offered by the Hamburg Hotel and Restaurant Keepers.	Not awarded.

Five Pounds offered by the Altona Butter-merchants, for last year's Dutch skim Cheese.	Mr. Heinecken of Amsterdam.

DAIRY IMPLEMENTS AND ACCESSORIES.

MACHINES.

Two boxes, each containing Twenty-five Pounds, offered by the Senate of Hamburg.	1st Prize to Herr Carl Lund of Copenhagen. 2nd Prize to Herr Alborn of Hildesheim.

COLLECTION OF DAIRY IMPLEMENTS AND UTENSILS.

A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Herr Carlshütte of Rendsburg.
A piece of Plate offered by their Imperial Highnesses the Crown Prince and Princess of Germany.	Herr Alborn of Hildesheim.
A Silver Dinner Service offered by Herr Albertus von Ohlendorff, for the best and most complete Collection of Implements and Utensils applied to Dairying.	Herr Benno Martiny of Lizthof, for his general efforts to improve Dairy Farming.

SCIENTIFIC APPLIANCES.

A box containing Twenty-five Pounds offered by the Senate of Hamburg.	Herr Schatzmann of Lausanne, for his long-continued and pioneering activity in dairy-farming, as well as for various services to the Exhibition.
A piece of Plate offered by Herr Kafemann of Danzig, Proprietor of the "Milch-zeitung."	Herr C. J. Wickberg of Helsingfors, Finland, for the Maps and Drawings exhibited by him, and for their influence upon the improvement of the Dairying of that country.

MEANS OF INSTRUCTION IN DAIRYING.

A piece of Plate offered by the Grand Duke of Oldenburg, for the best set of books recording the operations of a Dairy for 12 months, and showing their technical and economical relations.	Mrs. Helene Beckhusen of Rastede, Oldenburg.
Five Pounds offered by the Agricultural Society of Hildesheim, for a similar set of books kept in an associated Dairy.	Herr Daniel Goebel of Weseleyhof, near Flensburg.

In addition to the foregoing, the butter merchants of Hamburg offered two prizes of the value of 25*l.* each, one for an Explanation of the cause of butter becoming rancid (*stoff bildung*), with a means of preventing it; and the other for an Explanation of the cause of butter becoming oily, with a means of preventing it. As none of the prizes were offered until after the entries had closed, there was no competition for these, so the Jury divided the 50*l.* into four equal prizes, and awarded them to special exhibits of butter, viz., (1) The Finland Collection, (2) Herr

Ihlefeld of Friedrichsdorf, near Heidekaten, Mecklenburg-Schwerin, (3) Herr C. Wachtmeister, of Hildesborg, Landskrona, Sweden, (4) Associated Dairy of Zieten, East Prussia.

A very practical addition to the arrangements usually seen at Dairy-shows was an establishment designated a "Kosthalle," or Tasting-stall; the only drawback to which was the not uncommon one that the public patronised it in far larger numbers than could be properly served in the space which was devoted to it, and by the number of attendants who were allotted for the sale of the samples. The following extract from the rules will give a clear idea of the nature and object of this institution :—

ARRANGEMENTS FOR THE TASTING-STALL.

1. Beside the Dairy Exhibition, a Tasting-stall will be erected for the purpose of enabling the visitors to taste the produce exhibited; thus giving the exhibitors the opportunity of making their goods better known, than by merely exposing them for view.

2. Every description of goods which is admitted to the Exhibition, and is suitable for tasting, can be sent to the Tasting-stall; namely, every description of butter and cheese; of every sort not less than 2 kilo (4¼ lbs.), and not more than 5 kilo (10¼ lbs.) must be delivered.

3. It will be entirely left to the option of the exhibitors to send goods to the Tasting-stall or not; however, it will be in their interest, as well as in that of visitors, if opportunity is afforded of tasting the goods, in order to form a right judgment.

4. The exhibitors who send goods to the Tasting-stall must name the selling price and quantity sent, for which the Exhibition Committee will pay them; but in case that no compensation should be asked, the proceeds will be used in defraying the expenses of the Exhibition.

BUTTER.

The processes of butter-making generally adopted on the Continent may be resolved into two classes, in one of which the cream is churned sweet and in the other sour. Occasionally the milk is churned in large dairies. These methods are well known and need no description ; but a variation in the process of making butter from sweet cream, which has recently been extensively adopted in Northern Europe, may be usefully mentioned. The milk is set in deep cans, which are placed in a tank and surrounded with a mixture of ice and water, so as to reduce the temperature of the milk as much as possible, generally to about 42° Fahr. The effect of this low temperature is to cause the cream to rise so rapidly, that nearly the whole of it can be got after 12 hours' setting. A Swedish farmer, Mr. Swartz, of Hofgården, near Wadstena, discovered this peculiar effect of a very low temperature upon milk, and appreciated its importance as a factor in the manufacture of the best quality of keeping butter. By churning cream absolutely sweet, the minimum amount of curd is obtained with the butter, and as curd is the ingredient which contributes most to spoil the taste of butter after it has been kept some time, Mr. Swartz's discovery was of incalculable benefit to those who produced butter for export, in countries where ice is easily obtained. This system, repeatedly quoted in the catalogue of the exhibition as "Swartz's Verfahren," is now extensively practised throughout the north of Europe, and has been the direct cause of the great improvement in the quality of much, if not most, of the butter which is sent to Hamburg and to England from Sweden, Finland, Denmark, and North Germany. The enthusiastic reception of this veteran dairyman at the banquets held during the period of the Exhibition, testified most eloquently to the estimation in which his discovery is held.

It is, perhaps, unnecessary to add that no system of setting milk or of churning cream is in itself sufficient for the production of the best quality of butter. The Jury were therefore requested to report upon each exhibit under the heads of "Taste," "Colour," "Salt," "Working," "Packing," and "General Quality"; and also to make any special remarks that seemed to them desirable. They observe that such matters as colour and saltness depend chiefly upon the prevailing taste of the market for which the butter is destined, but sometimes upon the traditionary practices of the locality in which it is made. The taste, however; and still more the working and packing depend upon the skill with which the various operations are conducted, from the feeding of the cows to the final operation of packing for market. The Judges were instructed to classify their judgment under the following heads:—"Very Fine," "Fine," "Good," "Middling," "Ordinary," and "Bad;" and they reported that while they had given very wide limits to the qualities of colour and saltness, they were of opinion that, owing to the prevalence of two faults, viz., churning the cream too sour, and overworking the butter, a comparatively small proportion of exhibits could be classed as "Fine" and Very Fine." For instance, of butter intended for immediate consumption, there was but one exhibit stamped as "Very Fine" in each of the two classes (salted and unsalted), and in each case the honourable exception came from the remote Russian province of Finland. In the class of "Packing Butter made in winter," the awards of "very fine" were:—Schleswig-Holstein, 4 exhibits; Sweden, 3; and Denmark, 7, while other districts failed to obtain any such distinction, as also did the whole of the exhibitors of "Packing Butter made in summer and autumn," although in this class Denmark and Finland (notwithstanding the rigour of its winter climate) were strong in examples of "Fine" butter.

The following statement will give an idea of the extent of the exhibition of butter as a whole, and of the "national collections" which formed so conspicuous a feature of it:—

	No. of entries.	
SECTION I.		
Condensed and Preserved Milk	13	
SECTION II.		
A. *a.* Fresh Butter (salted):—		
Schleswig-Holstein Collection	12	
Westphalian "	16	
Oldenburg "	21	
Hildesheim "	18	
Prussian "	10	
Russian "	8	
Finland "	23	
Other exhibits	60	
	—	168
A. *b.* Fresh Butter (unsalted):—		
Finland Collection	29	
Other exhibits	18	
	—	47
B. *a.* Keeping Butter, made in winter:—		
Schleswig-Holstein Collection	95	
Swedish "	36	
Danish "	39	
Prussian "	55	
Russian Baltic "	23	
Russian "	3	
Finland "	27	
Other exhibits	49	
	—	327
B. *b.* Keeping Butter, made in summer or autumn:—		
Schleswig-Holstein Collection	18	
Danish "	1	
Westphalian "	2	
Dutch "	3	
Prussian "	7	
Russian Baltic "	3	
Finland "	10	
Other exhibits	6	
	—	50
C. Preserved Butter:—		
Swedish Collection	3	
Danish "	20	
Other exhibits	28	
	—	51
D. Whey Butter		4
E. Melted Butter		7
F. Artificial Butter		11
		665

It is perhaps necessary to mention that by "Preserved Butter" is meant butter packed in tins hermetically sealed, and intended chiefly for exportation to tropical countries. The method of making and packing this butter I have already described in my report on Denmark. "Melted Butter," as its name implies, has been subjected to the action of heat, in fact it has been boiled; and although this process destroys the flavour of the butter, it prevents it from turning sour. This butter is chiefly used for culinary purposes. "Artificial Butter" is made by the Megé process from animal fat, mixed with a larger or smaller proportion of real butter. Like melted butter, it is doubtless a useful substance in the kitchen, but is not likely to supersede the real article for direct consumption, except to the extent to which it is used as an adulterating ingredient.

CHEESE.

Cheese-making, as a general rule, is not only a much more complicated process than butter-making, but it admits of an almost infinite variety of processes, both before and after the one essential stage of separating the curd from the whey; and the products obtained differ very widely from each other. It may be convenient to divide cheese into two great groups, viz., hard cheese and soft cheese. In England our celebrated kinds are all of the former class; and, except in a few limited districts, the English soft cheese is known all over the country under the general name of "Cream Cheese." English cheese-makers endeavour, as far as possible, to obtain a clean delicate flavour and an agreeable aroma; for cheese in England is looked upon as a wholesome and nutritious article of food. On the European continent, the hard kinds of cheese are well represented by the Gruyère, the Dutch makes, and by the Italian Gorgonzola, which is the continental representative of our Stilton; but even these kinds, which are to a great extent manufactured for exportation, are characterised by a more pungent flavour than is desired in cheeses of English make. The continental varieties of soft cheese are very numerous, and with the exception of some of the more delicate French sorts, are nearly all noted for their high flavour and disagreeable smell. These cheeses, however, are held in great estimation in European countries as a flavouring material, a very small portion being sufficient to produce the desired effect upon the palate. The kinds of cheese which the working classes use as an article of food are made from skim-milk, buttermilk, or even whey; and in many districts an additional aromatic flavour is imparted to them by mixing carraway or cummin seeds with the curd. An enumeration of all the different kinds exhibited at Hamburg would convey no idea to the reader, while a description of them would require more than a whole number of the 'Journal.' It will be sufficient to mention that more than fifty well-defined kinds of cheese were exhibited, and that they came from the different countries in the following numbers:—

Cheese fron Cows' Milk:—		
Schleswig-Holstein Collection	20	
Danish ,,	15	
Westphalian ,,	9	
Prussian ,,	32	
Dutch ,,	119	
Swedish ,,	16	
Oldenburg ,,	4	
Hildesheim ,,	14	
Swiss ,,	13	
Italian ,,	19	
Russian ,,	9	
Russian Baltic Province	6	
Russian Finland ,,	1	
Various countries	82	
		359
Cheese from Goats' Milk		1
Cheese from Sheep's Milk		2
Sundry Milk products		6
		368

With regard to the quality of the cheese exhibited, the Judges reported that if more care and observation were brought to bear upon the process of cheese-making, a far better product would be obtained in the majority of instances. At the same time they had no difficulty in selecting several of the cheeses exhibited as worthy of the highest commendation. Accordingly 21 exhibits were decorated as "Very Fine," and of these 13 were Dutch, 3 Swedish, 1 Norwegian, 1 English, 2 German, and 1 Austrian. It should, however, be added, that several of the Dutch cheeses thus distinguished were "cream cheeses" by description, although to all appearance of the ordinary Dutch make.

One of the Judges of cheese, Mr. Eastty, of the firm of Eastty and Corderoy, Hibernia Chambers, London, was nominated by the Royal Agricultural Society, and I have much pleasure in appending his Report on this portion of the Exhibition.

"In accordance with your request, I now make the attempt to give expression to my opinion concerning the Cheese shown at the Hamburg Exhibition.

"You will from your own observation be aware how inadequate an attempt was made to show our home production; and the few cheeses that were entered would convey no true idea even of the external beauty which characterises some of our English dairies, and which are equally distinguished by their rich quality, clear colour, and pure flavour.

"The American cheeses that were shown were, perhaps, even more destitute of the points of excellence which have made them so deservedly popular in this country, and created a trade of such enormous proportions.

"The Exhibition was most creditable to the dairymen of various districts on the European Continent, but its interest would undoubtedly have been much enhanced by a more ample show of some of our handsome English cheese. It may be that the good markets at the present time render it a matter of indifference to our dairy farmers to find new fields for distribution; but it is not always so, and on the principle that supply creates demand, the consumption of cheese as an article of food might be greatly increased on the Continent. In some seasons (as witness that of 1876), other than home channels are wanted to save much cheese from going to utter putrefaction, while at present, English, or, as they will persist in calling it, 'Chester cheese,' is retailed in France, Germany, and other parts, at more than double the price made here.

"The solitary Stilton exhibited cut but a poor figure in comparison with some fine Roquefort.

"As, however, the Exhibition consisted mainly of cheese made on the Continent, it is perhaps difficult to put any report into such a shape as will interest any of our dairymen in England.

"I was pleased to observe some Swedish cheese made on the Cheddar pattern, though one only of the group proved itself entitled to any praise on the score of internal merit. Yet as to shape and make the whole would have passed muster in company with some of our good Somerset cheese. Russian cheese, however, took a high place in my estimation as to appearance and really fair quality, being upright, well made, and tolerably rich. If facilities exist there to make such cheese to any extent, and at moderate cost, they would certainly find a good market in this country, and pass over the cheesemonger's counter interchangeably with Cheddar, Cheshire, and American cheese.

"With regard to other sorts, Dutch made an imposing appearance, and deserved high commendation. Their merits, however, are sufficiently esteemed in particular districts (mainly our eastern and southern counties) to render any special remarks superfluous, and in those districts, notwithstanding the excessively high prices now ruling, they find a large consumption.

"Parmesan and Gruyère also made a show which must have gratified the epicurean eye, but except as a mere article of luxury would make no appeal to the British palate.

"As to some other sorts, which it would be invidious to describe or distinguish by naming the districts from which they came, I do not exaggerate when I say that not only would such descriptions not enter any English mouth, but they would not even find house room in this country.

"With the hypercritical taste superinduced by the meritorious qualities of much of our English and American cheese, and the almost universal demand in our large towns for mild flavour combined with rich quality, I have come to the conclusion that but little cheese will for the present be made on the Continent of Europe which can in any way come into competition with that of our own dairy districts.

"Cheese eating abroad is essentially a different thing from the custom in England. In some foreign parts a morsel to sting the tongue is all that is generally desired. Here, it must be remembered, it is an article of food, and that of the most nutritious character. For the labourer or hungry huntsman it is a dish which can be brought out at a moment's notice. In mild weather, too, it serves the poorer classes for a meal, while a fire is rendered unnecessary for its preparation.

"The traditions and uses of our fine English cheese retain all their force to encourage the manufacture of similar qualities in whatever quarter of the world they can be produced. In proportion as high prices remove this article from the tables of the people, a void is felt in domestic life which fully justifies the lament and philosophy of our great dramatist,

> 'Why, my CHEESE, my DIGESTION, why hast thou not served thyself in to my table so many meals?'

"Yours most truly,
"JOHN EASTTY.

"London, 10th March, 1877."

In addition to these remarks it should be stated that all the countries of northern Europe strive to produce a quality of cheese that will find a ready sale in English markets. The round Dutch, or Edam, cheese has for many years been a favourite cheese in some parts of England, and especially in the Eastern counties, where it is said to command a higher price than its intrinsic merit would alone warrant. The exhibition of Dutch cheese at Hamburg gave a most instructive clue to the success which has attended the introduction of that article into England. The ten dozen or so of these cheeses exhibited every variety of shape, colour, and richness, and the object of each variation from the familiar Edam was to bring the cheese into accord with the taste or fancy of the market for which it was destined. Thus two exhibitors showed collections of Dutch cheese made partly in May, partly in summer, and partly in autumn, and designed for exportation to all quarters of the globe, each cheese being marked with the country of its destination — for instance England, Belgium, France, Germany, Norway and Sweden (with an admixture of carraways), Mediterranean countries, Turkey, Russia, East and West Indies, South America, &c., &c.

It was also most interesting to see that a Russian dairy-school had sent a Cheddar, a Brie, and a Swiss green cheese (Kräutekäse), all made from the milk of cows kept at the school-farm, and although the jury did not commend any of the Russian cheese exhibited, there can be no doubt that great efforts are being made in several provinces of the Empire to improve the quality of their dairy products by the establishment of dairy-schools, and the employment of travelling instructors. The magnificent exhibition of butter from the province of Finland was a proof of the success which has already attended these efforts in that department of dairy production. This success could not, however, have been achieved without the adoption of Mr. Swartz's method of cooling the milk, and skimming after twelve hours' setting, and although by this means most of the cream is obtained, and the butter realises a very high price, a sufficient residuum is left to make its profitable disposal a matter of some importance. Mr. Busck, jun., of Copenhagen, the Manager of the Danish Preserved Butter Company, has devoted much attention to the subject, and has recommended a method of cheese-making to those farmers who supply his company with butter made in accordance with his rules.* Mr. Busck has kindly favoured me with the following brief sketch of this system :—

> In order to obtain the best result, it is necessary that the *sweet* butter-milk should be mixed with the twelve-hours-old skim-milk—a suitable proportion would be a hundred pounds of butter-milk and four to six hundred pounds of skim-milk. The butter-milk must always be taken *immediately* after the stopping of the churn, and will then give a good result both as to quantity and quality; the skim-milk in the cheese-tub must always be heated and ready to receive the butter-milk as soon as the butter is taken out of the churn, upon which the cheese-colouring (three- to four-hundredths of a lb. to 1000 lbs. of milk, and two- to three-hundredths of a lb. of the rennet manufactured by Mr. Christopher Hansen, of Copenhagen, to 100 lbs. of milk) is added *immediately*. The quantity of rennet to be employed depends upon the freshness of the milk; the richer the milk the more rennet. The temperature of the milk ought to be, in the dry warm season—May to November—90 to 93 degrees Fahr.; from November to May, two to five degrees higher, and *no farther heating must take place*. The curdling

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* 'Journal Royal Agricultural Society,' 2nd series, vol. xii., p. 350, 1876.

time—that is, the time from the adding of the rennet until the cutting begins—ought to be about 20 minutes, not above 30 minutes, and *the cheese-tub must during this time be covered with a lid.* The cheese must be cut with great care. The best way of doing this is with a "lyre," or compound cheese-knife, first one way and then the other, so as to produce little squares; after this the mass is stirred to make it still finer, first very slowly, then a little quicker. When it is sufficiently fine it is left for some minutes to settle, upon which the whey is drawn off, and the cheese-mass is heaped up in the middle of the tub, *and covered with a bell-shaped cover*, that the greater part of the whey may slowly run off *without reducing the temperature of the cheese.* After this, it is cut with a knife into small squares, and passed twice through the cheese-mill. The mass—*which ought now to be of a temperature of* 82 *to* 93 *degrees*—is gently placed in smooth layers in the cheese-moulds which are then put into the press. The cheese is turned three times, the first time after the lapse of an hour, the second time after a lapse of two hours, and the third time two hours later, when the date of its manufacture is affixed. Well dried and perfectly clean cloths must be used at all times. In the evening the cheese is taken out of the press, and laid, for four days and nights, in a *strong* salt pickle, and in which it is turned every twelve hours, and each time a handful of coarse salt spread upon the cheese. In winter the cheese is kept for two to three weeks in a dry place, being carefully turned daily, so as not to damage the edges, as a good appearance, next to good flavour, always increases the value. Now the cheese should be placed in a dry cellar, and must continue to be turned every day, and dried with a cloth. In summer, when the air is dry and warm, the fresh cheese may be taken direct from the pickle to the cellar, which ought to be kept dry and well ventilated. A good result of all cheese-making demands great care as regards the temperature and curdling time, as well as in the cutting and in the draining of the whey, for *the particles of fat* in the mass of cheese may easily be *lost* in the whey by *violent* treatment. *It is of the greatest consequence that the mass of cheese should be as warm as possible when placed in the moulds*, and it must, therefore, *not be omitted to cover* the mass while heaped up in the middle of the tub that the whey may run off. Full pressure must never be put on directly, but must be effected with one weight first, two weights after the first turning, and three weights after the last turning of the cheese, as violence, in this stage, may also be attended with bad results. *If the butter-milk is not taken immediately after the stopping of the churn, or is heated together with the skim-milk, it will spoil the cheese by making it bitter.* The temperature of the cheese-room ought to be between 45 and 55 degrees Fahrenheit. In winter it is quite necessary to have all utensils, such as cheese-moulds, &c., as well as the room where the cheeses under press are kept, properly heated—about 55 degrees Fahrenheit; the mass might otherwise be too suddenly cooled down during the process, or before it is ready to come from the press, which will more or less injure the cheese. The first twelve days after calving, the milk can only improve the cheese, whereas it has quite a contrary effect upon the butter, for which reason it may be used, together with the skim-milk, *without previous skimming.*

IMPLEMENTS.

This department of the Exhibition was well filled with varieties of churns and cheese-tubs, butter-workers and cheese-presses, and all other dairy-appliances. Almost every known variety of churn was represented, and some few that are more or less novel. Amongst the latter was a Bullard's "Patent Oscillating Churn," exhibited by Messrs. Braymann and Filler, of Hamburg, and apparently the same as that described by Mr. Coleman in his Report on the Philadelphia Exhibition;[*] also a "Cataract Churn," in which the cream was dashed by a revolving dash-board upwards and outwards against the circumference of an upright churn, furnished also with fixed dash-boards, which then gave the cream a return motion towards the centre, so that it appeared to fall over like a cataract from all round the churn to the axis of the revolving dash-board. The action looked pretty but not practical, and in the opinion of the Judges the churn was complicated, and not well adapted for its purpose, besides being difficult to clean. However, it pleased the public, and it was stated that a large number of the churns were sold.

Butter-working machines, both straight and circular, were exhibited in great variety, but with no sufficiently striking novelty to call for special description. These implements are coming into general use in the dairies of the north of Europe, and it seems remarkable that they have not yet attracted more attention in England.[†]

The cheese-tubs and cheese-presses were of the familiar forms, and included American factory sizes of the former.

Lawrence's milk-cooler was exhibited in its original form, and with modifications. The Judges submitted one of the original machines to a competitive trial against a new form exhibited by Messrs. Boldt and Vogel, of Hamburg, and having the flutings elongated in section instead of semicircular. The result was considerably in favour of the latter.

Three firms exhibited complete collections of dairy-apparatus, including steam-engines and every means and appliance necessary for a dairy worked under some special system. For instance: the Carlshütte Company exhibited a collection suitable for the Holstein dairy-system, including the broad flat milk-pans, and the skimming-rake described and figured in my report on that subject. This collection was very good, and was awarded a prize of 25*l.* and a box offered by the Senate of Hamburg. Mr. Alborn, of Hildesheim, on the other hand, exhibited a complete set of fittings necessary for dairying upon Mr. Swartz's system, which is now fast supplanting the old methods, wherever ice can be conveniently procured. The Judges reported very highly of this collection, and awarded it the piece of plate offered by the Crown Prince and Princess of Germany; and its use was practically demonstrated by the exhibitor having butter and cheese made daily before the public on Mr. Swartz's method.

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[*] 'Journal of the Royal Agricultural Society,' *ante*, p 82.

[†] For figures and descriptions of these machines, see vol. xi., p. 225, and vol. xii., p. 349, of the second series of this Journal.

The total cost of the Exhibition, exclusive of the value of the prizes, amounted to 52,986 marks, or nearly 2650*l.*; and the receipts from all sources came to 42,229 marks, or 2110*l.*; leaving a deficit of 540*l.* Of this sum, 500*l.* was covered by the surplus of an Agricultural Exhibition held in 1863, which had been placed at the disposal of the Executive Committee of the Dairy Show, and the remainder was subscribed by the members of the committee, so that the guarantors were not called upon to contribute.

The holding of the Exhibition was made the occasion of lectures in the afternoons and banquets in the evenings; and the hospitality and kindness of the German people were never more conspicuous. The officers of the Exhibition earned the warmest thanks of all the delegates, and more particularly of those who attended as representatives of the English Societies. Several of these gentlemen I knew or had corresponded with before, and nothing could be more cordial than their reception of me, both personally and officially; while, in addition to the increased knowledge of dairy-farming which the Exhibition enabled me to acquire, I have the most pleasing reminiscence of the many new friendships which I formed on the occasion.

XXIII.—*Further Notes of Experiments at the Brown Institution on the Communication of Foot and-Mouth Disease from Diseased to Healthy Animals.* By W. Duguid, M.R.C.V.S., Veterinary Surgeon to the Institution.

In a Report already published in the 'Journal of the Royal Agricultural Society,'* Dr. Sanderson gave an account of some preliminary experiments on foot-and-mouth disease, which appeared to show that under certain circumstances its communication by mediate contagion is more difficult than is usually supposed. In the experiments in question, the infecting material was obtained at Deptford, either from live animals or (in one case) from an animal just slaughtered. In all these cases, the appearances of the disease were so characteristic that, although nothing was known of the previous history of the cases, no doubt could be entertained of their nature.

Opportunities have since offered themselves for repeating the most important of these observations, particularly those relating to the infecting power of the discharge from the mouth. For this purpose material was obtained, not from infected cattle just imported from the Continent, but from animals in the Metropolitan Cattle Market, reported by the Inspector as affected with foot-and-mouth disease.

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* Second Series, vol. xiii., p. 204.

As before, three of the experimental animals at the Brown Institution were fed, February 1st, 1877, with hay which was more or less soaked with the discharge from the mouths of the diseased animals. Subsequently, March 22nd, a fourth animal was treated in a similar manner. All of these acquired foot-and-mouth disease; the time of incubation in the several cases being thirty-six hours, two days, two days, and three days, the first indication of the disease being afforded by the increase of bodily temperature. In each case the rise of temperature was followed after one day by the first appearance of the mouth eruption, which, twenty-four hours later, had assumed the vesicular form.

The following Table exhibits the progress and duration of the disease:—

Number of Animal.	Temperature.			Eruption	
	First Rise.	Maximum Reached	Restoration to Normal.	First Appearance.	Full Development.
I.	48 hours .	4th day ..	7th day ..	3rd day ..	4th day.
II.	48 " ..	4th " ..	7th " ..	3rd " ..	4th "
III.	3rd day ..	5th " ..	8th " ..	4th " ..	5th "
IV.	36 hours ..	4th " ..	6th " ..	3rd " ..	4th "

The times stated in the Table are reckoned from the day on which the animals were fed on the soaked hay.

The range of temperature was as follows:—

Number of Animal	Normal.	First Rise	Maximum
I.	101°·99	102°·5	104°·8
II.	101·99	102·8	105·2
III.	102·0	103·1	105·6
IV.	101·55	102·2	104·5

The restoration of the temperature to the normal might be evidently taken in this disease as a good sign of convalescence, for although at this period the scars on the mucous membranes were very obvious, the animals had already begun to feed and ruminate naturally.

On the sixth day of the disease in the animal last experimented on, hay, soaked with discharge collected from the mouth, was given to two other healthy animals (the two three-year-olds), without any effect. It is interesting to notice that although the stableman who was employed in attending on the diseased animals had charge at the same time of four healthy ones, none of them were affected.

In order to obtain information as to the risk of communication of foot-and-mouth disease by litter removed from infected sheds, the bullock No. IV. was littered for eight days (*i.e.* the whole time of their illness) with the straw removed twice-a-day from Nos. I., II. and III., but it did not show any signs of infection.

The promptitude with which the same animal was attacked several weeks after, when fed with soaked hay, proved that this immunity was not dependent on insusceptibility. Finally, the two remaining animals not used in previous experiments were littered in a similar manner with the straw removed from No. IV. during the whole time of its illness, but again without effect.

XXIV.—*Report upon the Liverpool Prize-Farm Competition in Lancashire, Cheshire, and North Wales,* 1877—*Arable Farms.*

By SAMUEL D. SHIRRIFF, Saltcoats, Drem.

IN connection with the Royal Agricultural Society's Show, held at Liverpool last July, the Liverpool Local Committee offered prizes for the best-managed farms in Lancashire, Cheshire, Denbighshire, Flintshire, and the Isle of Man. The Judges of the competing farms were appointed by the Society, and this Report is a record of the grounds upon which the Judges gave their awards in the classes of arable farms in the above-mentioned English and Welsh counties. The publication of the report on the Isle of Man competition is unavoidably deferred until the next number of the 'Journal.' The competition was a large one, twenty-one farms being entered, classified thus:—

CLASS 1.—For the best-managed arable farm of 150 acres and upwards in extent, having at least two-thirds of its area under rotation of cropping, 50*l.*

CLASS 2.—For the best-managed arable farm of above 80 acres in extent and under 150 acres, having at least two-thirds of its area under rotation of cropping. First, 40*l.* Second, 20*l.*

CLASS 3.—For the best-managed arable farm above 40 acres and under 80 acres in extent, having at least two-thirds of its area under rotation of cropping, 20*l.*

The Judges were instructed specially to consider—

1. General management with a view to profit.
2. Productiveness of crops.
3. Goodness and suitability of live-stock.
4. Management of grass- and clover-lands.
5. State of gates, fences, roads, and general neatness.
6. Book-keeping.

These instructions, so simple and well arranged, prevented complication, while allowing full scope for comparison. In describing the nature of the country, I may say that generally the natural capabilities of the soil are not great; but as they have been aided by skilful management and large outlay, the district is now in a very high state of fertility. No district in England, however, shows a greater diversity as to soil, climate, and cultivation. The average rainfall is 26 inches, and the winter is comparatively mild, from proximity to the Atlantic Ocean. Before proceeding to detail the results of this competition, I may mention that it is but a sequel of many other competitions which had previously taken place in the same district.

The first heading for the consideration of the Judges was

GENERAL MANAGEMENT WITH A VIEW TO PROFIT.

Under this heading much depends upon the situation of the farm. I may here mention that all the competing farms under Class I., with one exception, and another farm which was withdrawn, were within easy carting distance of Liverpool or Manchester. The advantages of such a situation are very great, enabling the tenant to realise the highest prices for his produce, and to obtain liberal supplies of what may be called the "Magic Wand of Agriculture;" namely, abundance of manure of all kinds. We have a happy illustration, in these competing farms around Liverpool, of those mercantile principles so often found wanting in agricultural practice, viz., a profitable system of barter. The substantial success of these farms shows the benefit of freedom of cropping, combined with full liberty as to sale of produce. Even with the price of straw comparatively low, there is always a considerable balance in favour of the seller, although he may allow a liberal price for all the stable-dung of some livery stable where the horses are receiving full keep in hay and oats. It looks a fine thing on paper to say you will supply a large stable with straw, on condition of receiving all the dung as payment; but I have found from practical experience a considerable balance in favour of selling the straw and purchasing manure. This is another argument in favour of allowing tenants to sell the produce of their farms and re-purchasing manure. There is no more expensive system of making manure than by compelling a farmer to utilise all his straw at home. The expense of making the straw fit for application to the land is enormous. In out-lying districts, far away from railways, which means from agricultural civilisation, a primitive system of agriculture may profitably exist; but only under a correspondingly low rent. I know that exception may be taken to some of these statements. The success of the agriculturists who surround Liverpool and Manchester will be entirely attributed to situation; but I wish that those who may think so would go and judge for themselves. What I hold is this—the facilities for the transport of every description of farm-produce are now so great that the demands of our large cities are opened up to the farmers of the kingdom. The question therefore is, What proportion does rent bear to the cost of carriage? Although at first sight the balance may appear entirely in favour of farms situated near large towns, it can be shown that the margin of rent is almost equivalent to the cost of transport of produce, but of course the advantages of being able to deliver farm-produce direct from the farm are immense. I would here compliment the owners of the competing farms on the liberality of their covenants, which allow the tenants to sell whatever produce they choose; though I admit the necessity for restrictions in regard to cropping in some instances, but this can only be compared to penal laws for bad behaviour, which are, unfortunately, a necessary evil.

Another element of agricultural success the Judges found illustrated in a manner to be imitated and admired by all connected with agriculture—viz., the farmers themselves setting an example to their people, by earnest application to their business. Amidst the wail of agricultural distress, it is cheering to know that there is at least one district in the kingdom in which a meed of prosperity exists.

PRODUCTIVENESS OF CROPS.

Under the second heading, *Productiveness of Crops*, the present situation again tells its tale, the principal sums realised being from sales of hay and straw. The announcement, just made, of the agricultural prosperity of the farmers in this district may surprise farmers in other districts, and it may be attributed to a combination of fortunate circumstances. Possibly to some extent it may be so; but of this I feel assured, that the mercantile enterprise of Liverpool and Manchester merchants has imbued the agriculturists of the district with the same impetus. The

Judges were struck with the large amount of labour achieved on the farms with comparatively small appliances: so earnest was the application of the men, that it almost appeared as if a system of contract-work existed in every department, which was not so, but was merely the effect of every farm being well *mastered.*

The success of those farmers cannot be attributed to low rents. The land is rented at its full value. I could give an instance where a naturally poor clay-farm was simply made to pay by the very highest farming combined with individual effort, which means that the tenant himself did the work of three ordinary labourers.

The labourers in this district are well paid, and present a contrast to those of many districts of England, and the worst farming was observed where the labourers were underpaid.

The labour-bill for the year may be estimated at a trifle over 3*l.* per acre. On some farms the labourers received from 9*s.* to 10*s.* per week, with free board; where this was not supplied, 21*s.* per week may be taken as a fair average. This may sound high in the ears of some farmers in the South; but it must be understood that these men work hard and honestly earn their hire.

LIVE STOCK.

I now come, under the third heading, to speak of the *Goodness and Suitability of the Live Stock.*

The Horses were most suitable for their work, combining both strength and activity. The breed is known as the "Shire" horse, and may be described as being larger and more powerful than the Clydesdale, with a slight dash of blood, and admirably adapted for the road.

The Cows, which may be described as a Shorthorn cross, were generally large, with fine frames, showing great capabilities for dairy purposes.

The Feeding Cattle and Sheep may be described as a flying stock, and were only kept for a short time on the farms; the sheep are purchased in the autumn to eat up the aftermath, and generally fattened for sale about Christmas. Some farmers are in the habit of letting their foggage at so much per week.

The Pigs were generally a very fine breed.

The Poultry made a very profitable branch of the farm; in one instance nearly 10*s.* per acre being realised for poultry and eggs.

GRASS AND CLOVER LANDS.

The fourth heading for consideration was *Management of Grass and Clover Lands.*

This branch of agriculture is a most important one in the district, as the principal revenue of the farm depends upon sales of hay. The fields, which are laid down in clover and rye-grass, are cut for three consecutive years. The mixture consists of clovers, including red, white, alsike, and cow-grass, with a small percentage of rib-grass, Dogstail, Timothy, and Cocksfoot, and, what I would consider it unnecessary to sow, trefoil, at the rate of 18 lbs. per acre ; and, in addition to these, half a bushel of perennial and half a bushel of Italian rye-grass are sown per acre. Some farmers, with advantage, adopt a system of renewing their grass-fields for the third crop with a little extra sowing of red clover. Here I would recommend an autumn sowing of *Trifolium incarnatum.* A double turn of the harrows, when the ground is a little soft in the autumn, is sufficient to cause it to spring without injury to the older grasses.

GATES AND FENCES.

Fifth heading—*State of Gates, Fences, Roads, and General Neatness.*

However excellent the cultivation of the fields may be, how completely a favourable impression is destroyed by seeing bad roads, gappy, ill-trimmed, irregular fences, and badly-hung, ruinous-looking gates! In this district everything was trim and neat, large sums having been expended jointly by landlord and tenant in eradicating the irregular old fences and renewing them all in straight lines. These young fences are well kept on the system of allowing the hedges to grow wide at the bottom and slope up gradually to a narrow top. The gates were all substantial and well hung, and in all our journeyings we scarcely met with what might be called a rotten gate.

BOOK-KEEPING.

In regard to this it was not thought necessary to make any inspection. A great deal of agricultural success depends upon a thoroughly perfect system of farm-books. It is true the bank-book may give a fair enough index either of the success or non-success of the year ; but, seeing that various years must dovetail into each other, it is necessary to be able to refer to the outlay required for those years. It would be advisable that every farmer should keep a day-book with a register of every event, a cash-book, and a ledger, and it would also be of great value to keep an account for every field on the farm, posted up on the same principles as a merchant does his traders' accounts. I think this simile a true one, because an essential to success is thorough knowledge of a farm ; to know the nature of each field as thoroughly as a skilful physician does the habits and constitutions of his patients. The merchant gives credit to those of his customers whom he knows he can trust, and the farmer must give credit in manures to the fields which he knows will repay the outlay. Thus, by keeping an accurate account of the produce of each field, also the manures applied to it, much valuable information may be obtained.

YEARLY TENURE.

Before giving the opinion of the Judges upon the various farms, I would here make a few observations on the terms of occupancy. Of the whole number of competing farms, there was only one farmer who had a lease (21 years); the others were yearly tenants, mostly subject to two years' notice. This system is cried down as being an insurmountable evil and complete barrier to agricultural improvement. But I am happy to say that our experience of its effects in regard to this inspection is not so. We found a perfect confidence existing betwixt landlord and tenant; and so far from being a barrier to improvement, it will be seen, when details of the various farms in competition are given, how completely these particulars refute that statement! There were tenants who had occupied the farms, from father to son, who confidently and boldly carried on all improvements. Indeed, my own faith in leases is in a great degree shaken. Generally at the end of a lease a fresh valuation is taken, often before the improvements have recouped the tenant under his present lease; the yearly tenant goes on from year to year. Where extra buildings are required (and in some instances the benefit of an increase of them might be suggested), the money could be borrowed from one of the Lands Improvement Companies, and both principal and interest repaid at 6½ per cent. in 25 years. Tenants who require extra buildings might apply for the required outlay, if necessary; its advantages will repay the 6½ per cent., and this percentage strengthens further the bond of union betwixt landlord and tenant. The landlord must see the advantage of having the value of his steading thus increased, and will naturally look to the tenant who made this venture to clear off the debt. In short, this building-loan almost insures the tenant all the privileges of a lease, as far as security of tenure goes. What added much to the pleasure of the inspection was the feeling of hearty good-will existing in the hearts of the tenants to their landlords.

The entries were all made by the 1st of October, 1876. The Council of the Royal Society had recommended that three inspections be made: one during winter, in order to judge of the stock and root-crops of the farms; the second to take place in the end of April or beginning of May, to judge of the spring cultivation of the ground; and the last to take place about the end of June, to judge the crops. On this occasion the Judges thought it unnecessary to have a spring inspection, the winter and summer ones being thought sufficient for the purpose. The Judges met at Liverpool on the 11th of December, and next morning proceeded with their work. As the object of this inspection was merely to judge the stock and root-crops, I need give no special details of it, but merely notice the regret of the Judges at the withdrawal from the competition of Mr. Tunstall, St. Michael's-on-Wyre, a tenant of Lord Derby, on account of his crops having suffered so much from wire-worm. The Shorthorn stock upon this farm was of peculiar merit, and would do honour to any breeder in the kingdom. I would also refer to the enterprise of Mr. Kay, of Warburton Park, near Warrington, who, a few days previous to our inspection, had a sale by auction of a very large number of fat cattle. I would also notice, in reference to the winter inspection, the admirable system adopted of utilising the portion of the root-crop kept for home use by means of pulping and steaming, and mixing with chopped hay and straw, with the addition of ground Indian corn; and also the careful economy in the use of straw, so as to secure comfort for the animals with a minimum quantity of litter.

CLASS I.

Mrs. Birch, Netherton.—First in honour, as in place, was the farm of *Netherton*, near Aintree, in the occupancy of *Mrs. Ellen Birch*, to whom the Judges awarded the first prize. This farm contains 242 acres, and is held in yearly tenure under Lord Sefton. The nature of the soil may be described as black soil on sand and peaty loam, the greater portion of the land resting upon a sandy subsoil. The surface is slightly undulating, and about 80 feet above the sea-level.

At the date of the last inspection, 3rd July, the farm was under the following cultivation:—

	Acres.
Barley (Chevalier)	42
Oats (Yellow Poland)	26
Wheat (Hunter White)	38
Turnips (Greentop Swede)	3
Potatoes (Regents, Downs, and Skerryblues)	30
Hay Grass	62
Pasture	12
Irrigated Meadow	29
	242

Of these crops, the barley, being in the shot blade, did not show to the same advantage as it would do at a later period, but promised to be a fine crop. The oats, which were grown after beans, were a magnificent crop. I should estimate them at over 80 bushels per acre.

The wheat—one field in particular—was a beautiful crop, and with favourable circumstances its yield would be very large. Another field of wheat had suffered from the wet weather, but was still a fair good crop.

The turnips were healthy and vigorous.

Potatoes showed a fine sheen on the leaf, indicating health and vigour in the plants from plenty of manure at the roots, and promised to be a good crop.

The hay was most excellent, and the meadows showed a large bulk.

The stock on the farm consisted of—

8 working-horses of a capital class.
2 colts, two years old.
1 do. yearling.
1 do. yearling—half-bred.
1 foal.
15 store-pigs.
3 breeding-sows.
1 boar of the most approved breed.
4 milking-cows.
2 heifers, two years old.
8 yearling heifers.
3 calves.
1 Shorthorn bull.

The horses are fed on hay, corn, steamed roots, bran and chaff in winter, and corn and grass in summer. The cows are fed on turnips and Indian corn-meal in winter, and grass and hay in summer. The pigs are fed on steamed potatoes and offal grain-flour, and Indian corn-meal in winter, and Indian flour, steamed, in summer.

The class of implements was good and varied, admirably suited for the tillage of the farm.

The sum expended on labour is from 800*l.* to 1000*l.* yearly, but of course this is regulated by the labour-market and any difference in the cropping of the farm.

The quantity of manure used on the farm may be estimated at 1000 tons annually, with the addition of 8 tons of nitrate of soda, and 1 ton of phospho-guano; the nitrate being nearly all applied to the grass-land for hay. With regard to the grain-crops of this farm, I would draw special attention to the large field of oats grown after beans, the beans grown after grass. The usual practice is to take oats after the grass, then beans to follow the oats; but this system has been reversed with wonderful success. Of course, this system can only be practised on land which is thoroughly clean. The mixture of clover-seed with rye-grass used by Mrs. Birch, per acre, was, red clover, 7 lbs.; alsike, 4 lbs.; rib-grass, 1 lb.; white clover, 2 lbs.; 15 lbs. in all, with ½ bushel of perennial and the same of Italian rye-grass.

The rotation on this farm is, 1st, roots; 2nd, wheat or barley; 3rd, barley or oats; 4th, seeds; which lie two years, sometimes three. The Judges were much struck with the high cultivation of this farm; and it did not require a very practised eye to see that it had been for a long time under the best management. The fields did not wear the look of having put on a holiday attire for a single year, but told a tale of the culture of years. During the occupancy of Mrs. Birch and her late husband, 30 lineal miles of drains have been laid down, with open tiles on slate soles, the landlord paying half of the expense of the materials. In 1848 the late Mr. Birch was awarded a premium for laying 19 miles of drains, and also gained a premium for eradicating 4866 yards of old fences, and in destroying, at his own expense, the old fences, clearing waste land and filling up pits. He thus obtained 8 acres of land which is cultivated, and planted 3188 yards of young hedges. How pleasing would it be to this pioneer of agriculture could he now see the results of his labour. They tell of the honesty of the soil, which in time will always repay judicious outlay; and they also bear testimony to a system of hereditary tenure most honourable to the Sefton estate; and, above all, how gratifying to Mrs. Birch to occupy the proud position she now holds, and to reap the reward of the enterprise and skill of her late husband, while she sees the fruits of them continue to improve under the management of her son!

Stand Farm, near Croxteth Park, 6 miles S.E. of Liverpool, which obtained the second place in this class, and was awarded a Gold Medal by the Local Committee, is the property of Lord Sefton, and is occupied by *Mr. John Wright*, under yearly tenure.

This farm is a much more difficult one to manage than Netherton. There is a much greater variety of soil, some being very light and some very heavy. The subsoil is clay and rock. The farm adjoins Lord Sefton's residence, Croxteth Hall. It is not my province here to touch upon the game question, that being a matter of arrangement between landlord and tenant; but some of the fields suffered to some extent from their proximity to the game preserves. The woods which surround these fields

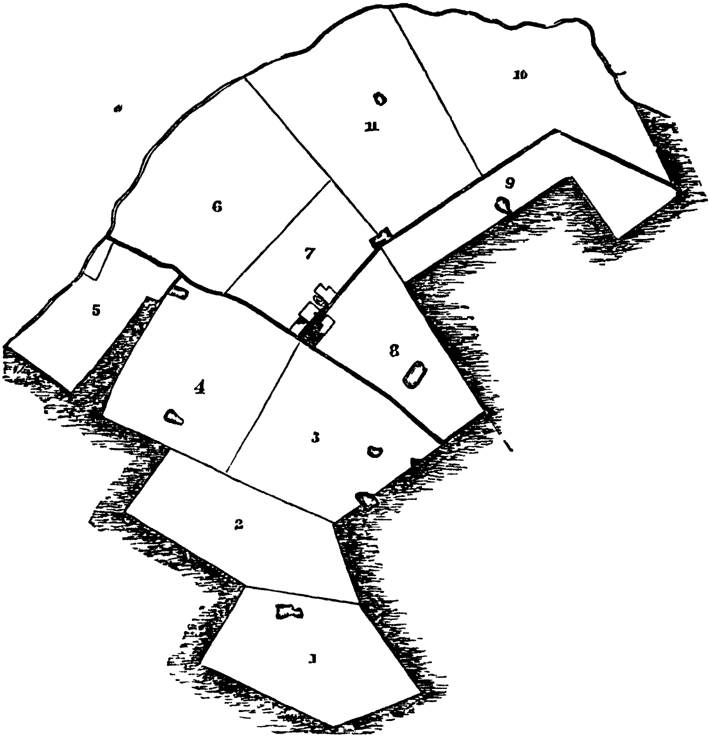

Fig. 1.—*Plan of Stand Farm, Croxteth.*

		Statute		
		A.	R.	P.
	House, Outbuildings, &c	2	0	0
1.	Lord's Close	37	1	0
2.	Little Lord's Close..	34	2	20
3	Ox Pasture	33	0	28
4	Stand Close	26	2	0
5	Moss Close	20	0	0
6	Beggar's Bower	36	2	24
	Carried forward	190	0	32
	Brought forward	190	0	32
7	Green Hey	18	1	10
8.	Front Field	17	2	16
9	Long Hey	20	3	4
10.	Little Feeding Pasture . ..	34	2	10
11.	Big Feeding Pasture	44	2	8
		326	0	0

cause a shade, which prevents the soil from obtaining the benefit of the sun and wind, especially in wet seasons; but, notwithstanding these difficulties, this farm was in a most admirable state of cultivation. Any one conversant with agriculture must know how difficult it is to farm clay-land sheltered by plantations, especially in such a season as this year; and the unfortunate circumstance of a field lying close to these plantations, on which the previous crop had been potatoes, and which the wet season prevented being sown with wheat, went far to deprive Mr. Wright of the first prize. This field having been sown with oats, the crop, at the date of our inspection, 4th July, had but a poor appearance; but the other crops on the farm gave indications of being very large, especially a field of barley, which was the best we saw during the whole inspection. There was also a very grand field of Longfellow oats, second to nothing we saw during our journeyings. Owing to the circumstance above mentioned, Mr. Wright had no wheat on his farm.

The farm contains 326 acres under the following rotation:—

	Acres.
Cut for hay	155
Pasture	16
Potatoes	24
Turnips	4
Oats	103
Barley	22
Buildings and garden	2
	326

The stock of the farm consists of—

11 Working-horses of a most useful stamp, combining activity and strength, some of them of a high class; also
2 Horses for riding or driving.
2 Milk-cows.
3 Stirks.

We also saw 9 four-year-old Highland bullocks, fine-looking animals. These were grazing on the old pastures, which excellent keep, along with cake, would soon make them of very fine quality. Mr. Wright annually purchases about 400 (wethers) half-bred sheep, in autumn, in Scotland, to eat up the foggage; these he clears off as they fatten, the whole lot being generally sold off by the beginning of December. One of the secrets of Mr. Wright's successful haymaking lies in this system. There were also seven pigs fattening, mostly for home use. This completes the stock of the farm. I now come to describe Mr. Wright's system of management.

The horses are fed thus: 14 lbs. of crushed Indian corn, with as much cut hay as the carters think proper for them. Mr. Wright serves out the weekly quantity of ground Indian corn for each pair of horses to the carters on *Mondays.* This system diminishes the probability of horses receiving an over-dose on the idle day, viz., Sunday. Mr. Wright is a great believer in the superiority of waggons over the old-fashioned carts. He uses four waggons for the delivery of his produce, and for bringing the return cargo of manure. He considers that these waggons save him 200*l.* a year, in comparison with carts. The waggons go to Liverpool in the morning with either hay or straw (about 2½ tons), and return at night with a load of manure of between 50 and 60 cwts. He drives over 1200 tons of manure from Liverpool annually. This is placed in a large midden-stead (only requiring a roof to make it perfect), cut out of the solid rock, which retains all the liquid manure, the surplus of which is carted on the land for irrigation. The dung-heap I saw, when on our winter inspection (a portion of it then being carted on to grass), I could only compare to a solid mountain of manure. He attaches so much value to his hay-crop, that he manures his old grass for the grain-crop, and re-sows it with seeds. I am not sure of this being the best system. An application of artificials, viz., 2 cwt. per acre of potash in its natural form, as procured from the German mines, with 2 cwt. superphosphate (mineral), and 2 cwt. bone-meal, would probably insure better results. In addition to the 1200 tons of Liverpool manure, Mr. Wright also uses 13 tons of nitrate of soda ; 3 tons of Peruvian guano, and 10 tons of Hide salt, the latter being applied to certain soils. This I have proved in my own experience to be of great value ; it stiffens the straw and increases the yield.

The implements and machinery on this farm are very superior. Mr. Wright has erected a horizontal engine, with Cornish boiler, of 9-horse power, but capable of being worked up to 13, for the purpose of driving a Marshall's double-blasting, self-feeding, portable threshing-machine; also a pair of millstones; hay-cutter; kibbling-machine, capable of doing 60 bushels per hour; also oil-cake mill. The engine and machinery are so conveniently arranged, that all the exhaust steam, after passing through the cylinder, is utilised for cooking the food for the stock, as well as boiling the water previous to its being pumped into the boiler, thus saving 25 per cent. of fuel. There is a large water cistern, cut out of the solid rock, underneath the yard, bricked, cemented, and covered with large flags, 9 feet long by 3 feet wide and 12 inches thick. This cistern is capable of holding 20,000 gallons of rain-water, collected from the roofs of the buildings. This must be very convenient in a dry season, as Mr. Wright told us he was never without a supply of water. The cistern was made by Mr. Wright's father.

During the last few months 300*l.* has been expended in repairing the farm-buildings; also over a mile of occupation-roads have been laid, for which the landlord allowed 100*l.*, Mr. Wright making up the balance of outlay. Now, listen, ye of little faith in yearly tenures. This agricultural Leonidas has erected two sheds on 9-inch pitch-pine posts, with corrugated galvanised-iron roofs. One shed is 100 feet long by 30 feet wide, 18 feet to eaves; the other is 40 feet by 30 feet, also 18 feet to eaves. The cost of the large shed was 185*l.*, and of the smaller one 91*l.* The advantage and convenience of these sheds are immense. What a deal of labour is saved in regard to the temporary covering of unfinished ricks! but if you consider the present price of straw (thatch), about 6*l.* per ton (and this is no fictitious price, because straw is steadily and surely becoming more largely used in paper-making), how very soon these sheds will repay the outlay! These sheds are certain to be erected on many farms. On a fine property in Denmark, in the island of Falster, most admirably farmed by the proprietor (Mr. Tesdorpf) himself, I last year saw a shed which I can only compare to the 'Great Eastern,' keel upwards, capable of holding the whole crop of the farm. This shed was entirely made of wood. If the Lands Improvement Companies would make advances for these sheds, tenant-farmers would do well to take advantage of the loan. Before closing this account of Mr. Wright's farm, it should be mentioned that this system of high farming is successful. The farm, as already stated, is a difficult one to manage, and surrounded by game-preserves. Of these Mr. Wright never complained; his practice is successful, and he knows the best antidote to game is high farming, to make the grain-crops so luxuriant that ground-game will not face it.

I have omitted to mention that Mr. Wright uses an elevator (1-horse), capable of delivering 10 tons of hay per hour. I sum up Mr. Wright best by saying that he mentioned how much he was indebted for the foundation of his success to his father and how much he would have appreciated the further application of machinery; and, as he stood and we admired the excellent working of the machine, he added, "I wish my father had lived to see that!"

Aigburth, in the occupation of *Mr. William Scotson*, was placed third in Class I., and also was awarded a Gold Medal by the Local Committee. The farm lies 4 miles S.E. of Liverpool, the London and North-Western Railway running through the middle of it. The farm, as held by Mr. Scotson, measures 284 acres of arable land and 10 of old pasture. The proprietorship is rather singular, as 160 acres belong to one landlord, 80 to another, and 20 to a third; and 34 acres have been added to it. The fields are all tolerably compact; still, taken as a whole, I would characterise the place as being rather awkward to manage. The soil is rather light, about 80 acres being on the Old Red Sandstone, the remainder sand and clay. On the day of the last inspection, 5th July, the farm was under the following crops:—

	Acres.
Wheat	64
Oats	47
Barley	22
1 year's grass	47
2 years' grass	55
Pasture	15
Potatoes	30
Carried forward	280

	Acres.
Brought forward	280
Mangolds	3
Turnips	3
Vetches	2½
Homestead, garden, roads, &c.	5½
	294

The crops were all very good, especially one field of oats. The hay was a most excellent crop. I also especially noticed a very fine field of potatoes. There is a great deal of *dash* in Mr. Scotson's farming. He will have a good crop, if the land is capable of producing it. His system is similar to that of Mrs. Birch and Mr. Wright, with regard to sales of hay and straw to the Liverpool market; but Mr. Scotson sells and realises a large sum for second-crop clover, sold green, at an average of about 28*s*. per ton.

To illustrate Mr. Scotson's enterprise, I saw a promising field of potatoes planted on land which had produced a hay-crop this year. The varieties of potatoes grown by Mr. Scotson are, Victorias, Regents, Skerries, Down's Kemps, Redbogs, and Dalmahoys. The Poland oats, so generally sown, appear overrated; and a great deal of the wheat seems to have deteriorated in character, from being sown year after year with the same seed, *without change*. The stock consists of—

9 farm horses, useful nags.
3 colts.
2 ponies, one a perfect little prince.
9 milk-cows, one of these a most extraordinary fine animal.
4 yearling bulls.
3 calves.
1 two-year-old bull;

also 3 horses, grazing at so much per week; besides 12 store-pigs.

Mr. Scotson's Dalmahoy potatoes (very early variety) were nearly all sown with swedes between the drills, thus securing two crops in one year. The swede-plants were looking vigorous and healthy. About 1*l*. per week may be taken as the wages of full active labourers on Mr. Scotson's farm, his annual bill being about 700*l*., equal to about 50*s*. per acre. This farm is highly cultivated, and, though detached and owned by so many proprietors, Mr. Scotson is most liberal in the use of guano and nitrate of soda for top-dressing. I have omitted to mention that he fattens about 20 bullocks during the winter, and also feeds on his foggage 7 score of Cheviot ewes, which are sold fat during winter.

He has a good collection of implements, including a manure-distributor. This is a most necessary implement when so much dependence is placed on the hay-crop. Mr. Scotson's rotation is, roots, wheat or barley, barley or oats and seeds, which lie two or three years. Mr. Scotson finds an advantage in re-sowing a few seeds for the third year. This farm is being very much built upon. I leave Mr. Scotson with an expression of the pleasure that my colleagues and I had in meeting with such a thoroughly practical farmer.

Roby Farm.—Perhaps there is no better known farm in the neighbourhood of Liverpool than *Roby Farm*, near Prescot, the property of the Earl of Derby, and in the occupation of *Mr. William Gore Ashton.*

This farm of 166 acres is all arable. The soil is mostly heavy, but a small portion is light. The subsoil is a mixture of marl, sand, and gravel. Like the others, it is held on yearly tenure. It is only five miles from Liverpool, and every advantage of situation is taken in the application of Liverpool manure to the land. Mr. Ashton purchases 700 tons, which—in addition to 120 tons of manure made on the farm, and a quantity of lime and saw-dust—is used for both cereal and root-crops. Mr. Ashton uses about 6 tons of nitrate of soda for top-dressing. When the farm was inspected, 5th July, it was under cropping as follows:—

	Acres		Acres.
Wheat	40	Brought forward	82
Oats	19	Vetches	8
Potatoes	18	Pasture	6
Turnips	4	Clover and seeds	44
Mangolds	1	Meadow	26
Carried forward	82		166

The wheat was a very fine crop and very pure; one field was equal to any seen during the inspection. The general neatness of this farm could not be surpassed. The fences are remarkably well cared-for, and the occupation roads kept in capital repair. The farm is also very clean.

The stock consists of—

7 working-horses, strong animals;
2 cows; and
4 pigs fed for home use.

The foggage, or aftermath, is let for sheep at so much per week. Occasionally Mr. Ashton sells his second-crop clover; I think he mentioned having received 3*d.* per stone. He feeds his horses entirely on Indian corn. His labour-bill is within a trifle of 300*l.* a year. Three carters whom he employs receive the equivalent of 23*s.* per week. I give in full Mr. Ashton's mixture of grass-seeds per imperial acre:—

½ bushel Percy's perennial rye-grass.
½ ditto Italian.
3 lbs. red clover.
3 lbs. cow-grass.
3 lbs. alsike.
2 lbs. Timothy-grass.
2 lbs. cocksfoot.
2 lbs. crested dogstail.
2 lbs. rib-grass.
1½ lb. trefoil.
½ lb. giant white.
1 lb. sweet vernal.
1 lb. oat-grass.

This is rather a singular mixture, and deserving of special notice. Some of these grasses, from their permanence, may add considerably to the hay-crop when the grass is cut the third year for hay. I would rather object to having any trefoil sown, somehow *that always appears of its own accord.* It may be of interest, if merely for a record of the season, to note dates of cutting. Mr. Ashton began to cut Italian rye-grass and clover, sold green for the market, on the 16th of May; and began to cut the second crop on the 5th of July. The hay-crop he commenced on the 25th of June. He was also growing 8 acres of vetches to cut and cart away green; a portion of these were to supply the live stock in the Liverpool Showyard. It may be beyond my province to suggest any improvement on such excellent management of land, but where there is such a demand for early green food, I would hint at the possibility of rye being sown immediately after the first of the grain-crop is carried; it could be cut in time for a green-crop, and would be marketed fully twelve days earlier than Italian rye-grass. *Trifolium incarnatum* might be tried with advantage on some of these early stubbles; a double turn of the harrows is sufficient to cover it. The implements on this farm of 166 acres are as follows:—2 waggons; 2 large and 5 small carts; 3 combined mowers and reapers; 1 reaper; 2 grubbers; 2 scarifiers; 2 double rest, 2 double-furrow, and 5 swing ploughs; 3 pairs of two-horse harrows; 2 pairs of clover and seed-harrows; 2 pairs of bow-harrows; 2 drill-harrows; 2 heavy-land rollers, also turnip and seed rollers; 2 horse hay-rakes, and 2 hay-rowers; winnowing machine, weighing machine, turnip-cutter and pulper, potato-crusher, and sundry other articles of use. Mr. Ashton has been a successful competitor in many local competitions, and it is possible that when Lord Derby made the statement that the

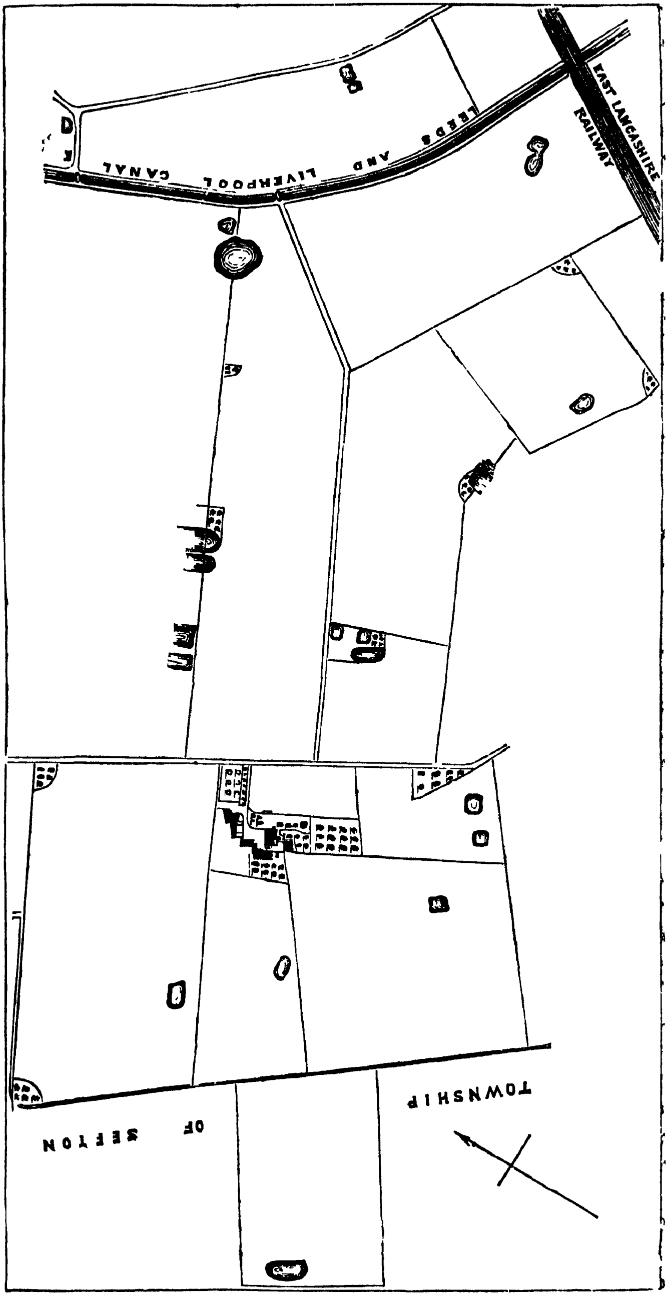

Fig. 2.—*Plan of Stand Park Farm, in the Occupation of Mr. Edward Musker.*

land-produce of England might be doubled if a higher state of cultivation were introduced, his knowledge of this excellently managed farm formed a basis for his opinion.

Stand Park Farm, the next to describe, is the property of Lord Sefton, and is tenanted by *Mr. Edward Musker;* it lies four miles north of Liverpool, near Aintree. It consists of 248 statute acres, arable, also 27 acres of low-lying land (meadow) four miles from the homestead. The nature of the soil is light peaty loam, and sandy loam on a sandy subsoil. The farm is held under yearly tenancy, and has been occupied by Mr. Musker for 11 years; during which time he has remodelled it by squaring fields and straightening fences, of which he has eradicated 5860 yards at his own cost; filled up ditches and drained with tiles, provided by the landlord at half-cost to the tenant; planted 4830 yards of new fencing at his own cost, the landlord finding quicks (young plants); filled up 13 pits; carted materials for house and steading, cottages, &c.; pulled up 100 yards of useless road, and filled up 450 yards of main watercourse, drained with stone slabs at his own cost. When he entered the farm there were 50 fields; these are now reduced to 15. He has also done a great deal of tile-draining. These facts prove the enterprise of Mr. Musker. The rotation is, roots, wheat, barley, and seeds, which lie three years. The wheat on the best land was a very fine crop; the barley was rather light; the hay was a good crop; but the potatoes did not promise to be very good. They require to be grown from fresh seed at least every second year, and to be brought from a colder or later district to an earlier clime. The fences and ditches were well cared for. The farm, as a whole, looked well.

When the farm was inspected, on the 3rd of July, the crops were as follows:—

	Acres.		Acres.
Wheat	41	Brought forward	144
Barley	30	Clover-hay (1st year)	42
Oats	28	„ (2nd year)	46
Potatoes	40	Pasture	17
Mangolds	2½	Low meadow land	27
Swedes	2½		
			276
Carried forward	144		

The stock consisted of 8 most excellent working-horses (Mr. Musker had the misfortune to lose a very fine one we saw on our winter inspection). He breeds his own cows, of which he keeps 10 of a high class; 7 two-year-olds; 7 yearlings; 2 bulls; 2 brood sows, and fattens produce. Mr. Musker's system of tillage is "*deep cultivation and plenty of manure.*" These I would suggest as *armorial bearings for every rotation agriculturist.* He purchases about 800 tons of horse- and cow-dung annually. This, in addition to home-made manures, gives a liberal allowance for green-crop. The mixture of grass-seeds sown includes the following, viz.:—

6 lbs. red clover.
4 lbs. cow-grass.
2 lbs. alsike.
2 lbs. white clover.
1 lb. rib-grass.
—
15 lbs. per statute acre.

Mr. Musker's farm is in every respect a well-managed holding. In regard to labour, there are five ploughmen employed, who receive 18*s.* a week with free house. One man receives 22*l.* per annum with board. Irish labourers are employed when required, at 18*s.* per week. Mr. Musker's opinion of the labour-question is this: expenses increasing in the ratio of one-third less work, at an increase of cost. It appeared to me during the inspection that labourers were well paid, and worked well for their hire.

Warburton Park, is in Cheshire, within seven miles of Manchester, in the yearly occupation of *Mr. Kay*, and is the property of Roland E. E. Warburton, Esq. There are 130 statute acres, arable, 115 pasture land, and 90 acres of meadow, half light and half heavy land. Subsoil of light land a brown loam; of heavy land a clay subsoil. This farm was inspected on the 23rd of June. The rotation is a four-course shift, with part of the grass-land made into roots. The arable land was apportioned thus:—Wheat, 40 acres, after potatoes, beans, mangolds, and turnips; oats, 39 acres; no barley; clover-hay, 40 acres; meadow, 97 acres; 32 acres potatoes, manured with purchased dung at the rate of 75 tons per Cheshire acre. The annual labour-bill on this farm is 1250*l.* The system of management is very perfect. A bell rings the labourers to work at 6.30 A.M., to stop at 11.45 A.M.; to work again at 12.50 P.M., and again to stop at 6. They are called at 5 A.M. The early work consists in cleaning stables, &c.

On this farm we saw a very fine field of potatoes, also a remarkably good crop of oats. The fences were nicely trimmed, and the ditches well looked after. In some portions of the root-crop the land was not quite so clean as others, but we thought highly of the farm as a whole.

Mr. Kay keeps a fine class of horses; he also breeds one or two blood-horses. A remarkably fine lot of heifers were fattening on pasture. The feeding stock on the farm may be described as a flying stock. Last year Mr. Kay kept 70 ewes, and fed 7 score (140) young sheep bought in September. He also sold in December 70 fat cattle; some of these he had grazed during the summer, the others he only had for a short time. The cattle are fed during winter on pulped turnips, meal, oil-cake, and hay. The horses are fed on Indian corn. There is not a single labourer's cottage on the farm, this brief notice of which I cannot close without allusion to the beautiful parterre in front of the house, "her farm," as Mrs. Kay termed it; it is laid out with singular taste.

Gill Moss Farm, Croxteth, about six miles from Liverpool, the property of Lord Sefton, farmed by *Mr. Mark Wright*, is a good specimen of a Lancashire farm and Lancashire management. Its size is 222 imperial acres. The soil is both light and heavy; and the subsoil, clay and sand. Like the others, it is held on yearly tenancy. The farm was inspected on the 4th of July. The morning being rather wet when we arrived, we inspected Mr. Wright's garden and greenhouse, and were much pleased with the culture and beauty of his flowers and vines. The inspection of his farm proved to our satisfaction that it was alone owing to a most untoward season that he did not take a high position in the competition. The rotation is similar to those already mentioned. The crops on the farm were:—

	Acres.		Acres.
Wheat (all spring sown)	40	Brought forward ..	146
Oats	42	Swedes	2
Clover-hay	21	Old pasture	16
Two-year-old hay	15	Old grass cut for hay ..	58
Potatoes	28		
			222
Carried forward ..	146		

And ½ an acre mangolds.

The wheat promised to be a very fine crop. The potatoes looked very well. The young grass-hay was a heavy crop. The old grass-hay was not so heavy as some others we saw. Mr. Wright is rather averse to the use of nitrate of soda. He uses over 1000 tons of purchased Liverpool manure and 4 tons of nitrate. His mixture of grass-seeds is—

6 lbs. red clover.
2½ lbs. alsike.
2½ lbs. rib grass; with
½ bushel perennial, and
½ bushel Italian rye-grass.

Mr. Wright's labour-bill is annually about 514*l.* He keeps 7 useful horses of a powerful stamp, 2 cows, and 2 heifers to replace the cows; about 4 pigs fattened for home use.

His potatoes are grown entirely with dung, no artificials being used. He would find a wonderful effect from a top-dressing of 1½ cwt. of nitrate, mixed with 1½ cwt. of superphosphate, immediately before earthing-up. Mr. Wright keeps no sheep, and everything is sold off. He knows the profit of selling the straw and re-purchasing manure, with all the cost of carting to and from Liverpool. A great deal has been done by Mr. Wright; he has remodelled his farm, which, when he entered it twenty-one years ago, consisted of 37 fields, now reduced to 20.

Mr. Robert Whalley, of *Mill Green*, Bold, near Warrington, is the only tenant in the competition who farms under a lease. This farm is deserving of special notice; the fields are exceedingly well laid out, the fences well cared for and the farming excellent. The steading is commodious and all lit with gas, and Mr. Whalley has admirable arrangements, especially with regard to economy of labour in pulping roots, and chopping hay and straw for winter-keep for his Shorthorn stock, which, including cows, heifers, and bulls (exclusive of 11 calves) numbered 38 at the time of our winter inspection. The steading is entirely under cover. But I must first describe the farm. There are 157 acres, imperial, of arable land, and 23 acres of pasture. The soil may be described as a strong loam; the subsoil of about 50 acres is on red sandstone; the remainder on strong clay. The farm is taken on a 21 years' lease. During Mr. Whalley's occupation the farm has changed owners. It is now held under the Trustees of the late Ralph Horsefield, Esq. The farm was inspected on the 9th of July, and was under crop as follows:—

23	acres	wheat,	after potatoes, turnips, and mangolds.
17	„	barley,	after wheat.
17	„	oats,	after third-year grass.
19	„	hay,	first year.
22	„	ditto,	second year.
24	„	ditto,	third year.
23	„	old pastures.	
17	„	potatoes,	after 3 years' grass.
4	„	turnips,	
3	„	mangolds,	
2½	„	vetches,	

To the green crop Mr. Whalley allowed 25 tons per acre of horse- and cow-manure, with a little nitrate to the mangolds, After the vetches are consumed, turnips were to be sown, with the same allowance of manure. The grass-land (hay-crop) is top-dressed with 10 tons of Peruvian guano; 3½ tons of nitrate of soda are used for the pasture. The season entirely militated against Mr. Whalley's chance of success, especially with regard to the potato-crop. The hay-crop—one field in particular—was very fine. The winter wheat was also good. The barley and oats did not promise much bulk. The working-horses, of which there were seven, are all first-class animals. I have not mentioned two good sows. Mr. Whalley lets his second crop of grass for sheep. The horses are fed entirely on Indian corn and chopped hay. The quantity of purchased manure used is over 300 tons; there is a great deal made on the farm. The implements are varied and sufficient. Both a wright and blacksmith are regularly employed on the farm. Mr. Whalley has two travelling mills, which he hires out in the neighbourhood. Some implements, especially a light harrow of his own construction, are held in great repute. He has been at very great expense in filling up those enormous pits which abound on many farms. The cost is very great, and would require a century to repay the labour-bill. The wages of the labourers are high, as the carters receive 22*s.* per week. Two men look after the cattle, and receive 10*s.* a week, with board. Mr. Whalley farms with the same rotation in general practice in the district; and he has a system of utilising the potato-stems for winter litter for stock, which he finds of great value, especially when straw is at such a high price.

I cannot conclude this notice without expressing the pleasure we all felt in our inspection of this farm, and, with a more favourable season for his land, feel assured that Mr. Whalley will not easily meet with defeat in any competition he may choose to enter.

Glenralon, the next farm I have to describe, lies in Denbighshire, North Wales, in Llangerniew parish, and is farmed by *Mr. William Hughes.* It is the property of Henry R. Sandbach, Esq., whose seat is Hafodunos, Abergele.

The farm consists of 284 acres.

The soil may be called medium; the subsoil is part gravel and some of it yellow clay. Those at all conversant with Welsh agriculture must know the difficulties farmers have to contend with, not only from the hilly nature of the country, but from the action of the glacial period of past ages. Even those fertile valleys (and there are many of them in Denbighshire) have large blocks of rock which were carried there by the icebergs of ancient days, and which interfere much with the cultivation of the land. When we inspected the farm on the 22nd of June, I was much struck with the contrast as compared with our winter visit last December. Though showery, we had a beautiful day, and were charmed not only with the beauty of the mountain scenery, but also impressed with the natural richness of the pastures. The very high system of arable farming, in the use of horse- and cow-made manure, carried on in the Liverpool district, is an impossibility here; but much is being done by this improving tenant.

The system of rotation is, 1st. Roots; 2nd. Wheat, barley, or oats; 3rd. Seeds, which lie three or four years. The farm was under the following crops:—

60 acres of oats (30 of them after turnips, 20 after grass, 10 after white crops).
5 acres wheat, red variety, after grass.
10 acres barley, after turnips.

These all promised to be fair average crops.

4 acres potatoes, after oats, well manured.
30 acres Swedish turnips, for which Mr. Hughes had purchased 7 tons of superphosphate, at 8*l*. A portion of these turnips were growing upon mountain-land, which was newly reclaimed.
23 acres hay. First year's crop, which was very good.
15 acres two-year-old pasture.
24 acres three-year-old ditto.
30 acres four-year-old ditto; also
10 acres old rough grass.

The arable land on this farm is described as 90 acres, with 194 acres of pasture. These figures also show how much the tenant is doing for his farm. He has only been three years in the farm, about 100 acres having been reclaimed from mountain pasture and a portion limed, the grass all taken out by the root, not burned. There is much to contend with from rocky soil and high situation. The Swedish turnip-field is 994 feet above the sea-level, the farmhouse 421 feet. Still the climate is not late, Mr. Hughes' hay having been ready for cutting when we were there; and I may also mention that we had early potatoes for dinner from Mr. Hughes' admirably managed garden, the first of open-air English growth we had seen.

In a pastoral country, such as this, a large stock is required. The farm-work is done by 6 horses, good sized, wiry, and active, having plenty of power. Mr. Hughes had 4 colts bred on the farm, he sells 2 every year; 150 ewes (suitable for a hilly country) and their produce, some of which are sold fat; also 180 wethers, bought in September, fed on grass, turnips, and oats; 12 useful cows, Shorthorn crosses; 12 two-year-old heifers and steers, 10 one-year-old ditto, and 3 sows. The poultry-yard is an important item in the farm-account, which, under Mr. Hughes' careful management, is a source of considerable profit. We saw beautiful flocks of both young turkeys and geese. We were very much pleased with our visit, and commend the tenant for his pluck in entering for this competition, at the same time fighting against impossibilities, as far as success was concerned, seeing the wide range of the competition brought into the field those highly cultivated farms around Liverpool, with their almost unlimited command of substance—viz. good manure—the liberal use of which can alone lead to success. This country cannot yet show much in the way of implements or machinery; but those in use were well adapted for the district.

CLASS II.

This class was for the best-managed farm (arable) above 80 acres in extent, and under 150 acres, having at least two-thirds of its area under rotation of cropping. First prize, 40*l.* Second prize, 20*l.*

Linacre, close by Linacre village, and occupied by *Mr. Samuel Cooke*, was the winning farm in this class. It lies four miles north of Liverpool, and is on the property of the Earl of Derby. The farm measures 130 acres, imperial. The soil is light, the subsoil sand resting on clay. The tenure is yearly, but Mr. Cooke has been all his life on the farm. I may mention, first of all, that this is a most unmanageable farm to work, being cut up with railways and other lands intersecting, besides being troubled with footpaths. A small portion of the farm is only in hand for this year. But all these difficulties have been successfully overcome by Mr. Cooke. The whole farm is particularly well managed. When the farm was inspected in December last, it was seen what excellent crops of hay, grain, and roots had been raised last year. Mr. Cooke follows the usual rotation—viz., potatoes and roots, wheat, barley, and seeds, which lie three years. The second inspection was on the 2nd of July. The crops were as follows:—

20 acres wheat; of these 5 after oats and 15 after potatoes.
15 acres barley, after wheat.
10 acres oats, after clover.
16 acres potatoes, after grass; varieties, Regents, Victorias, Dalmahoys, and Myatt's Kidneys.
13 acres clover-hay.
23 acres two-year-old hay.
14 acres three-year-old hay.
12 acres pasture, belonging to the Gas Company, and subject to three months' notice.

3 acres swedes, after grass.
2 acres mangolds, after potatoes; and
2 acres of Italian rye-grass on a piece of light gravelly soil, where wheat would not grow.

The wheat promised to be a good crop. The barley, like most farms in the neighbourhood, did not promise great luxuriance. A portion of the oats were grown on land where it was impossible to grow a large crop; where the soil was good the oats were a fair crop. The green crops, especially potatoes, were superior to every crop we saw during our inspection. I may apply the term "simply splendid," so healthy and vigorous were they. The hay-crop, all over, was also a large one. Mr. Cooke feeds his farm thus: he contracts for the manure from a stable of 94 horses, his calculation being that each horse makes 4 tons annually; he also purchases 340 tons of cow-dung. Of artificials, he purchases 7 tons nitrate of soda every year; no other artificial manure is used. Indian corn is the staple commodity of food for the stock; of this he annually purchases 1080 bushels. His horses never taste oats. In this respect we found all farmers follow the same system. The rotation adopted on this farm I have already given. When Mr. Cooke breaks up his grass-land for roots, he proportions these crops as far as possible, and as the fields will admit, to one-sixth. The green crops are very heavily manured, to carry on the succeeding crops during the rotation. Everything is sold off this farm except what is required for home use. The mixture of grass-seeds adopted by Mr. Cooke is 8 lbs. red clover, 3 lbs. alsike, 2 lbs. white clover, with 1 bushel perennial rye-grass.

Mr. Cooke sows no Italian rye-grass, which is rather singular. He began cutting grass on the 5th of May, which was very early for this season. The quantity of produce sold off this farm, in the shape of hay and straw, is very large; and here, as elsewhere, the profit between selling produce and re-purchasing large quantities of manure proves the advantage to the farmer of having full liberty of action in this respect.

The stock on the farm consists of—

5 very good working-horses. When I last saw them their coats shone like satin, especially a beautiful pair of blacks. There is also a useful pony.
10 milk-cows, Shorthorn crosses, nearly full blood; their milk is all churned.
4 two-year-old heifers.
5 yearlings and two bulls (young).
1 sow, whose produce is fed.

The hedges do not seem to thrive well here, there being too much smoke from the gasworks, &c.

The annual labour-bill is about 520*l.*

The management of the farm is admirably conducted all through, and reflects the greatest credit on Mr. Samuel Cooke.

Mr. Thomas Williamson, Linacre.—The Judges awarded the second prize of 20*l.* in this class to Mr. Thomas Williamson, whose farm, Linacre, is also the property of Lord Derby. The soil is very similar to Mr. Cooke's, being light; but some of it is superior in quality to the other farm; the subsoil is also sandy. These two farms are rather absurdly laid out in this respect: that, instead of both being in one block, the fields alternate—one field being Mr. Cooke's, the adjoining one Mr. Williamson's, and so on all through. The size of the farm is 126 acres, cropped thus:—

20	acres wheat, after roots.
20	acres barley, after wheat.
16	acres potatoes, after grass.
2	acres swedes.
21	acres clover-hay, first year.
14	acres ditto, second year's cutting.
20	acres ditto, third year's ditto.
11	acres pasture, six years old.
2	acres, steading, &c.
126	acres in all.

The wheat-crop on this farm was a very fine one, grown on a field of very variable land. The barley-crop was also good. The clover-hay was also a fine crop. The second and third year's hay was not so heavy, and the potatoes, as a whole, were not equal to Mr. Cooke's.

Mr. Williamson adopts the same system of supply of manure as his neighbour; of stable-dung he has the manure from 70 horses, equal to about 300 tons; also manure from 12 cows, equal to 180 tons. He uses 4 tons of nitrate of soda and 1 ton of Peruvian guano.

The mixture of grass-seeds sown is 6 lbs. red clover, 3 lbs. alsike, 1½ lb. trefoil, 1½ lb. white, 2 lbs. rib-grass, with ½ bush. Italian rye-grass and ½ bush. perennial. He differs from Mr. Cooke in the use of Italian rye-grass, the non-use of which in Mr. Cooke's case I cannot understand, seeing that it invariably adds both earliness and additional weight per acre to the crop. The stock on this farm consists of

5 working-horses and 1 pony.
13 cows; the milk is all churned.
5 pigs, fattening for home use.

Mr. Williamson follows the same rotation as Mr. Cooke. I may mention, in regard to green crop, that potatoes bear the proportion of seven-eighths to one-eighth of mangolds and turnips. Great dependence is placed on the potato-crop round Liverpool, and, from its being early lifted, there is comparatively little risk from disease. The labour-bill is annually over 500*l.*

Mr. Williamson buys 1100 bushels of Indian corn annually for his horses, &c.; and the same system of selling everything off is practised here, as on the other competing farms.

The fences are in capital order, and altogether the farm is exceedingly clean and well managed.

Burnt Mill Farm, farmed by *Mr. William Turton*, is on the property of Colonel J. J. Blackburne, of Hale Hall. The farm is 112 acres, imperial, in extent, 103 acres being arable, and 9 acres pasture land. The soil is very heavy, with a clay subsoil. The farm lies 10 miles south from Liverpool; it is naturally a very poor subject, and may be described as a cold, strong clay-farm, and most unmanageable in a season such as last. The nature of the tenure is described in Mr. Turton's schedule as being under "the new Act."

The rotation followed is, roots, wheat, oats, and seeds, which lie three years. The fields are perfectly laid out; upwards of two miles of young hedges have been planted, and all the waste and crooked fences eradicated. The utmost care is taken of these new fences, which are all trimmed by Mr. Turton's own hand. In every branch of the farm-work this excellent farmer shows his men how to do the work. I particularly noticed the ploughing of his land in winter, as well as his potato drills, all made by himself. They were the straightest and showed the best workmanship of any that we saw during our inspection.

The farm was under crop (July 7) as follows :—

5 acres wheat, after green crop.
10 acres oats, after wheat.
3½ acres potatoes, after grass.
Vetches, Mangolds, Turnips, } 10 acres, after grass.
10 acres pasture.
3 acres steading, &c.

The wheat on this farm promised to be a fair good crop; the varieties were Woolly Ear and Improved Waterloo, which resembles Hunter's Wheat in the ear. The latter variety suffered a good deal from being grown from seed which must have been raised in the same district for years. It is this which causes those deficient spaces where pickles ought to be at the bottom of each ear. Mr. Turton's Waterloo Wheat showed four and five blanks on both sides of the ear.

The oats, being grown on cold clay, had suffered much from wet and were a poor crop. The green crop, likewise, gave indication of an adverse season. It would be well for readers to note Mr. Turton's mixture of grass-seeds, because he showed us the finest crop of first year's clover-hay in the competition; and this, be it remembered, on naturally inferior land. The proportions of seeds were 5 lbs. red clover, 2½ lbs. cow-grass, 2½ lbs. alsike, 2 lbs. white clover, 3 lbs. rib-grass, 2½ lbs. dogstail, 2 lbs. trefoil, necessary for such cold poor soil; total, 19½ lbs.; ¾ bush. perennial rye-grass and ½ bush. Italian ditto.

The field of clover-hay I have referred to was 18 acres, after oats. Second year's hay, 16½ acres, after oats, was a very good crop. Third year's hay, 16½ acres, after oats, was a capital crop. I may mention that Mr. Turton has laid out his fields as nearly as possible all of the same size. He knows full well that nothing but plenty of warm, well-manufactured manure can put "animation" into cold lifeless clay. Of this manure he carts about 250 tons from Liverpool, and makes 150 tons (more or less) at home. He also expends 80*l.* upon artificials, principally nitrate of soda. He finds that he can purchase discoloured nitrate at a cheap rate, and that its action is quite equal to that of the supposed purer colour.

Mr. Turton employs 2 teams of horses, very powerful animals, also a pony. He has 4 cows, and their milk is all sold sweet; 5 two-year-old heifers and 4 calves; also 3 breeding sows, all of them fit to compete in any Showyard in the kingdom. The poultry on this farm are very good, and a most profitable stock; the number of eggs being so great that I suggested to Mrs. Turton the possibility of some of the hens laying twice a day, which she corroborated by stating she believed one particular hen did so. Taking this farm as a whole, there was an air of smartness, tidiness, and cleanliness all over the steading, which corresponded well with the general management of the farm. The tenant has been nine years in the farm. By comparison, we thought the rent of this farm a high one, the expenses being heavy. Mr. Turton keeps two carters and two labourers, at 1*l.* per week, taking on extra hands during haymaking and harvest as required; and a question which arose in our minds was, How many men is Mr. Turton himself equal to? I believe that to thoroughly *master* the farm as he does, his labour is equal to the labour of other three men. His annual expenditure for hired labour is 300*l.* I close this notice of Burnt Mill Farm with the hope that Mr. Turton may live to compete again. With a favourable season he will, indeed, be difficult to beat.

Mr. John Owen, who farms under H. R. Sandbach, Esq., of Hafodunos Hall in Denbighshire, on the same estate and a few miles from the farm of Mr. Hughes, who competed in Class 1, is the fourth and last competitor in Class 2. The name of this farm is Tyddynacha, parish of Llangerniew; it lies about 12 miles from Abergele, and its extent is 82 acres, all arable. The soil is partly light and partly heavy; the subsoil is some of it clay and parts of it gravelly and sandy. It is a most difficult farm to till, seeing that it almost forms the apex of a Welsh mountain. The steading stands 691 feet above the sea-level. This is a singularly well-managed farm, and deserving of a special prize. What chance could a farm on the summit of a Welsh mountain have in competition with the agricultural gardens around Liverpool? But this farm showed management equal to any that we saw in the competition.

The farm was cropped thus:—

6½ acres barley.
22 acres oats (Tawney variety).
4 acres swedes.
1 acre white turnips.
11½ acres clover-hay.
35 acres pasture, in 7 fields; one of these fields Mr. Owen intended to cut for hay. Of the pasture, 2 fields had been down for six years, 2 fields for three years, and 1 field two years.
1 acre of potatoes;
1½ acre *rocky pasture*.

These crops were all good, the clover-hay particularly so, for which Mr. Owen merits much credit. Some of the light land on this farm is liable to burn up crops before they reach maturity, the only way to prevent this being the application of lime-composts, clay, &c. The farm is remarkably clean; I should say it is a model in its class.

The stock consists of—

3 active working-horses and 1 colt.
7 cows.
7 two-year-olds.
7 yearlings, and
7 calves.

The proprietor keeps a good Shorthorn bull, which his tenants have the use of, at a small premium.

Mr. Owen keeps a few breeding ewes (Welsh), and sells the lambs fat. The price, 32*s.* apiece, rather surprised us (it speaks for the feeding qualities of the pasture). He also feeds 50 wether sheep, bought in September and sold off during winter.

We saw a draft of these sheep at our winter inspection; they pay a very good price per week, about 10*d.* Mr. Owen keeps one sow for breeding, sells part produce. The artificial manure used is 2 tons. It is possible that Mr. Owen is right in using a limited quantity here. The effect of artificials on some of these burning soils would only be to hasten the disaster. The fences on this farm, which is principally pasture, are excellent, being all planned for shelter; they are formed of old sod banks, with hedge on the top. The labour is supplied thus: one hired man, paid 9*s.* per week and food in the house. One of Mr. Owen's sons is paid 20*l.* a year. Two others (boys) receive 8*l.* each. These young men are treated in this respect the same as strangers, receiving a distinct hire, and are thus taught to begin at once and save money and depend upon themselves. The harvest wages are high, being 22*s.* per week, with rations, which is a curiosity I give in detail. The men work long hours, beginning at 6 A.M. and finishing at 7 P.M., with one hour's rest. However, they are tolerably well *sustained*, especially when contrasted with our Scotch porridge for two meals, and 16 ounces of bread and 1 quart of beer for dinner. The Welsh harvestman is fed thus:—Bread-and-butter, tea and milk, at 7 A.M.; dinner at 12, consisting of beef, bacon and potatoes, and milk; at 5, bread, butter and cheese, and butter-milk; at 7, sweet milk and bread. No beer is allowed at any meal. The rents of these farms, including tithes and rates, may be stated at about 1*l.* per acre, which may be taken as a fair value. The difficulties of cultivation are very great, as large crops can only be raised on level fields, and the handling of any crop is very difficult on an uneven surface. It is a great disadvantage when fields have a severe slope to the north; for example, in regard to ripening of grain. Mr. Owen is deserving of much praise for his pluck in entering for this competition, and for giving us an opportunity of judging a most excellent specimen of a Welsh mountain farm.

CLASS III.

In this class a prize of 20*l.* was offered for farms above 40 acres imperial and under 80 acres.

There is great diversity of opinion in reference to the advantage or disadvantage of small holdings. Some large farmers may be inclined to look askance on the farms of their smaller brethren, and some proprietors may likewise consider the expense of erecting and upholding a greater number of farmhouses and steadings a disadvantage; but, for all this, I feel inclined to write strongly in their favour. The great question of the day is, How is it possible to increase to the greatest extent the agricultural produce of our country? To achieve this, more capital must be applied to the cultivation of the land. I am well assured of this fact, that many an unsuccessful farmer feels his difficulties arise from having more land in his occupation than he has capital to manage; and even were it otherwise, on the principle of a Field-marshal's bâton being held in view to the meritorious soldier of the great Napoleon, an agricultural bâton, in the shape of a small farm, should be within the reach of an industrious saving farm-servant. The details of the prize-farm of this class, which I now come to narrate, show what wonderful results come from the application of large quantities of manure, combined with good management. The successful farm in this class is held in yearly tenure by Mr. Hugh Ainscough.

Banks, the prize farm, is about 5 miles from Southport, in the county of Lancaster, and belongs to the Trust Estate of the late Charles Scarisbrick, Esq. The farm measures 37 acres, imperial, of arable land, and 8 acres of pasture. It may be described as black soil, with moss subsoil. Mr. Ainscough farms his land with a three-course shift; first, potatoes and other roots, potatoes bearing the proportion of 3 to 1 of the other roots; second, wheat; third, seeds.

The crops on the farm this year were—

9 acres wheat, and
2 acres oats. These were grown on a piece of very inferior land, which had been ploughed up.
8 acres rye-grass and clover-hay.
2½ acres mangold.
1½ acre swedish turnips.
8 acres old pasture, which had lain for eight years.
1 acre steading, &c.

The wheat promised to be a fine crop. The oats were not much of a crop, owing to the wet season. The potatoes were wonderfully good; the varieties were Victorias, Regents, Redbogs, an early variety, and Pink-eyed Kents. The mangolds and swedes showed great vigour. The hay-crop was simply magnificent; if not quite 4 tons per statute acre, it was at least 70 cwt. There was not much clover to be seen, and Mr. Ainscough sows no perennial rye-grass, the mixture sown being 10 lbs. red clover and 1 bushel Italian rye-grass. The whole of the hay-crop is used at home, and Mr. Ainscough finds he can grow the greatest weight per acre from Italian rye-grass. Every particle is chopped, and thus there is no waste. Mr. Ainscough purchases annually 400 tons of stable and byre manures; and this, with what is made at home, gives a tremendous dose for his green crops.

The stock on the farm consists of (June 29):—

- 3 working-horses, viz. a very fine three-year-old, a four-year-old (also a good one), and an old horse with plenty of work in him still.
- 16 cows in full milk, and other 2 within a few days of calving.

Mr. Ainscough feeds annually about 14 pigs; those we saw were of a very good sort.

Of artificial manures applied this spring, the quantities were 1½ ton Liverpool patent manure, 16 cwt. Vickers' special manure, 16 cwt. ground bones, ½ ton nitrate of soda, and 14 cwt. salt. These artificials were applied principally to the grass.

The system adopted by Mr. Ainscough in the management of cows is to change them every six months. Their calves are sold as they are dropped, and the cows as they fatten, the selling price being generally 1*l.* above the in-purchase money. From January to May these cows are fed three times a day with turnips, chopped hay, grains (draff), and Indian-meal; each cow being allowed 14 lbs. Indian-meal per day. Of this there are 6 packs used every week during winter, a pack weighs 240 lbs., the average cost being 14*s.* 2*d.* per pack. During the summer months 4 packs are used. When the cows are turned out to grass they are brought into the byre twice a day, and fed with the same mixture as in winter. They are milked twice a day, viz. at half-past four in the morning, and at the same hour in the afternoon. This early system is also practised in Denmark, where the system of dairy management is perfect. The milk is all sold sweet. I do not, I hope, infringe upon privilege at all, especially when I have mentioned the possibility of small holdings being a means of increasing largely the agricultural produce of our country, if I mention that Mr. Ainscough sells close upon 600*l.* worth of sweet milk annually.

The labour on this farm is nearly all supplied by the family, with exception of one hired man, who receives 9*s.* per week, with board. Altogether there are 4 men employed on the farm, one of them constantly in driving the milk to Southport and elsewhere. There are 4 milkers, 2 men and 2 women who tend the cows; they have charge of 4 each. The sum paid per week to distillers for draff is 36*s.* I may mention that every square inch of this farm is made to do duty. We observed the very banks of the ditches, which were scoured; the cleanings of these were bound firm to the bank, and utilised by being worked up for cabbage, each spadeful of earth having a luxuriant young cabbage-plant growing in its centre. The produce of this farm is wonderful, and shows how much can be done by industry and skill and a most liberal application of manure.

Ireland's Farm, parish of Haleswood, the property of Colonel Blackburn, in the occupation of *Mr. John Pownall*, is an excellent illustration of Class III. The farm is 44 acres, or thereabouts, in extent; 38 acres arable, 6 acres old pasture. The soil is heavy; the subsoil very strong clay. The tenure is yearly. This farm lies about eight miles from Liverpool. The rotation is, roots, wheat, oats, which are always manured; then seeds, which lie for three or four years. A portion of last year's grass is made into summer fallow for wheat. The farm was inspected on 7th July. The crops were:—

Wheat, 5 acres, after green crops and fallow.
Oats, 5 acres, after wheat stubble well manured.
Potatoes, mangolds, and turnips, 1½ acre.
Clover hay, 5 acres.
2-year old hay, 5 acres.
7-year old hay, 5 acres.
Pasture, 2 acres.
Meadow, 6 acres.

These crops were all exceedingly good, considering the nature of the season. Mr. Pownall's mixture of grass-seeds consists of red clover, cow-grass, alsike, trefoil, rib-grass, with Italian and perennial rye-grass. I saw some very fine Italian nearly ready for a third cutting. There is a considerable quantity of vegetables grown on the farm. Mr. Pownall also sells a good deal of cutting grass (green). The stock consists of—

2 cart-horses, for breeding and working.
1 yearling and 1 foal.
3 cows. Milk and butter sold.
3 calves, and 1 brood-sow.

About 200 tons of manure is brought to the farm annually. A little nitrate of soda is used for top-dressing Italian rye-grass for early cutting. All the hay and straw which can be spared are sold. Indian corn is used for every description of stock. Labour is supplied by one hired man, at 1*l.* per week, and a boy lives in the house, who receives 2*s.* a week. Mr. Pownall has two cottages on the farm, which he lets at 7*l.* a year. The hired labour on this farm appears comparatively small; but, be it remembered, that Mr. Pownall is an exceedingly active man, and performs a very large amount of labour himself. He suffered alike with Mr. Turton from the adverse nature of the season for clay land, otherwise he would have run the winner very hard for first prize. Mr. Pownall has run all the new fences himself, and they are beautifully kept. He has been 18 years in the farm.

Mr. Joseph Kinsey, Royal Oak Farm.—This was a beautiful small farm in Cheshire, near Altrincham, and 7 miles from Manchester. It is on the property of F. W. Sutton, Esq., of Wythenshawe Hall, near Northenden. Royal Oak Farm is 72 acres, imperial, in extent, of which 66 acres are arable and 6 pasture. The soil is described in Mr. Kinsey's schedule as light, but it appeared to us to be more of a medium quality. The subsoil is partly clay and partly sand. Mr. Kinsey has been in the farm for 51 years. He entered it at first with a 21 years' lease, and has farmed it for the last 30 years on yearly tenure. This farmer is a most enterprising man. He has a fine collection of implements. On our winter inspection we noticed a plough at work with a revolving mould-board, which did most excellent work. There is a large shed on the farm put up by the landlord and planned by his agent, for which Mr. Kinsey pays 7 per cent. This shed is a great boon to the tenant, the interest on it being less than the cost of thatching the ricks, if the value of straw is taken into account; besides the immense advantage of having the crop secured from the weather the moment it is carried. In a few years, I have no doubt that these sheds will become the rule instead of the exception as at present. This shed, so substantial, at the same time simple and cheap in construction, does much credit to its designer, Thomas Worthington, Esq., the Mount, Northenden, Manchester. Mr. Kinsey follows this rotation: roots, wheat, seeds, then oats. His fields are well laid off. He has eradicated 1630 yards of old fences, and put the farm from 18 into 8 fields. He has also thoroughly drained and sewered the farm, having laid down 6000 large pipes. We inspected this farm on the 23rd of June. The crops were:—

Wheat, 11 acres, after potatoes, beans, turnips, mangolds.
Oats, 12 acres, after grass.
Potatoes, 8 acres.
Beans, 2 acres in drills, alternated with turnips.
Mangolds, 1 acre.
Swedes, ½ acre.
Clover-hay, 11 acres, which had been sown out with wheat-crop after potatoes.
Pasture meadow-hay, 17 acres.
Old pasture, 6 acres.

There is a large garden attached to the farm, the produce of which is sold. Mr. Kinsey also grows a few turnips for the vegetable market. These crops were all good. The clover-hay was a very fine crop.

There are 3 working-horses, one of them a beautiful roan Welsh brood-mare, also 3 young colts, and 3 milk-cows: Mr. Kinsey rears the heifer-calves. Three or four pigs are also fed, and the bacon not required for home use is sold.

The farm labour is supplied by 1 carter at 9*s.* per week, with rations; a boy at 5*s.* per week, with food; 1 labourer, an Irishman, at 16*s.* per week, with milk night and morning, also a quart of beer and bread-and-cheese; and another Irishman at 15*s.* per week, with same allowances. There is another man employed at 12*s.* a week, with dinner and an afternoon meal.

Mr. Kinsey buys a few sheep, about 45, in September, to eat up the foggage; these he fattens and sells off at Christmas. His horses are fed entirely on Indian corn. There is a fine old-fashioned hostelrie attached to this farm, of which Mr. Kinsey is mine host, where we enjoyed a hospitality we shall not easily forget.

Martin Lane, Burscough parish, tenanted by *Mr. John Pilkington*, is the last farm to describe in this competition. It is on the property of the Earl of Derby, and measures 57 acres, imperial; 50 arable and 7 pasture. The soil is in some parts light and others heavy; the subsoil is brown and black soil. The general aspect of the farm is good. Mr. Pilkington takes very great pride in his hedges, which are well cared for, though some of them are a little open below. His rotation is, roots, wheat, oats or barley, and seeds, which lie generally 2 years. The farm was visited on 29th June. The crops consisted of 8 acres of wheat, after potatoes; a part of this was a very fine crop. Oats, 3 acres after grass and 11 acres after wheat; a fair enough crop. Clover-hay, 1st year, 12 acres; ditto, 2nd year, 10 acres; a good crop, but showing rather too many weeds, which may possibly have come with the seeds. 9 acres of very well-managed potatoes, the varieties, viz., Victorias, Redbogs, and Pink-eyes, were exceedingly true, and promised to be a most excellent crop; in fact, we saw very few better during our inspection. Half an acre of mangolds; 5 acres of five-year-old pasture.

The stock consisted of 2 horses and a pony; 4 milk-cows; 2 heifers being grazed off the farm; 4 calves; 4 pigs fed annually.

The farm is well supplied with manure. Mr. Pilkington purchases a large quantity. Horse-manure costs 8*s.* 6*d.* per ton, delivered on the farm. The only artificial manure Mr. Pilkington believes in is nitrate of soda, of which he uses annually 2 tons.

Three men are employed on the farm, at 18*s.* per week; one man at 15*s.*, with food, which is a high wage. Three women also receive 1*s.* 6*d.* per day in winter. During haymaking and harvest the work-people are paid 21*s.* per week. Mr. Pilkington has been 70 years on this farm. He is now an old man, between 70 and 80, and must have seen many changes. He is a bachelor. and lives alone. He appeared to take much interest in this competition, and we all felt sorry we could not award him a prize. To show how anxious he was, he made a voyage to the Isle of Man in June, to view the farming there. He had heard of some farms in the Isle of Man which he fancied were entered in the same competition. He keeps a very singular assortment of walking-sticks, every one with as many twists in it as the horn of a very old black-faced Highland ram. This fine old farmer belongs to a class who, as it were, form a connecting-link between a past and present age. When they are gone, we shall all feel that a fine race of men has passed away.

SUMMARY.

In summing up my Report upon these farms, I have first to state that we received all possible information from each competitor with regard to actual deliveries off each farm of every kind of produce. It would be a breach of privilege were I to give these details in full, but I merely mention that the money realised for straw is very large, in fact, more than double its value if consumed at home; and the quantity of rich horse- and cow-manure which is brought to these farms to replace the hay and straw sold is far greater than all the home-grown material could produce. From having liberty of action in this respect, the condition of these farms is improved, and the farmers are enabled to overcome difficulties under which their less fortunate brethren are compelled to succumb. This is not alone owing to the situation of these farms. It is true they are placed in a district teeming with mercantile enterprise, and where the greatest facilities are afforded for the disposal of every variety of farm produce; but their success is owing principally to the benefits they enjoy from freedom in regard to cropping, and liberty to sell whatever produce is the most remunerative. How absurd it would appear in the eyes of the mercantile world to limit a general merchant to one or two specific articles of trade! and this is not one whit more ridiculous than the clauses of many land covenants. For example, nearly every lease enacts that in no case shall two white crops succeed each other, neither shall grass be cut for hay in two consecutive years. Besides its absurdity, and to show how easy it would be to evade the first of these clauses, how simple for a tenant to seed the stubble in autumn with either mustard or rape-seed, eat it down in April with sheep (a green crop thus intervenes), and then sow the land with barley! These antique documents were framed in days when rents were 100 per cent. below those of the present time, and when the aids or appliances to agriculture were most limited. The practice of agriculture has changed as much as, or even more than the practice of medicine or any other scientific or practical pursuit (I can remember when both men and horses were frequently bled nearly to death). No greater change has taken place in our weapons of warfare than in our agricultural implements and machinery, especially in regard to the utilisation of steam. All kinds of green crops were formerly of comparatively little value, and very high protective duties caused farmers to depend entirely upon the cereal crops for livelihood and rent. But these days have gone by. The agriculture of this country is now in competition with the world. The speed of an express train might as well be limited to the rate per mile of an old stage-coach as to bind the agriculture of present times to the systems of the past. A brief, but at the same time binding, letter of lease should be granted to some such effect as this:—"I let you my land (making, of course, such reservations in regard to game or mines, or liberty to replant or re-occupy, which are all matters of agreement between landlord and tenant), but you may crop your land in the manner you find most remunerative to yourself; only the condition of the farm must not be deteriorated, otherwise your tenure will cease and damages be claimed." Any one looking over the cropping of the farms mentioned in this Report must be struck with the very small amount of green-crop, especially turnips, grown on most farms. It is a well-ascertained fact that a turnip contains over 90 per cent. of water, and the question arises, What is the value of the remaining 10 per cent. of its constituents compared with other feeding substances? Of course, a large breadth of turnips is necessary for a proper cultivation of the soil in many districts, and on a good crop depends the success of a rotation; but it is a mistake to enforce their cultivation in every district. The great question is, How to make a farm pay the rent and yield most profit to the occupant, and at the same time increase its fertility? This can only be done by *high farming*. There was not a farm entered for the competition which did not illustrate this, although they embraced every variety of soil, viz., in Cheshire, Altrincham and Lynn; in Lancashire, Ormskirk, Linacre, Sefton, Aigburth, Halewood, Bold, Warrington, and Croxteth. As already mentioned, a uniform system of rotation is adopted in most of these farms, viz., roots, wheat, barley or oats and seeds, which generally lie three years. The old system used to be to break up the grass for oats, then summer fallow; 3rd wheat, then fallow again, &c. High farming will, in time, overcome the difficulties of soil. Large applications of good manure ameliorate the soil, and to a great extent change its constitution. Manure may almost be likened to Charity, in rendering a twofold blessing, it gives an increase of body to light land and renders stiff land more yielding and pliant. I have not attempted to detail the systems of cultivation practised in regard to the working of the land for the various crops, nor the quantities of seed applied per acre. The maxim to adopt for the former is, as far as possible, to allow nothing to grow but *what you wish to grow*, and for the quantity of seed, the doggrel lines—

> " There was a cobbler in Dunoon,
> And all he wanted was *elbow* room,"

are true for cereals as well as for cobblers.

One of the most pleasing features of our experience connected with this competition was the strong feeling of "*entente cordiale*" which we found to exist between the tenants and their landlords. The farms are all taken on fair terms. The rents vary from 45*s.* to 60*s.* per acre, inclusive of tithes and taxes, according to the quality of the soil. The buildings on most farms are excellent. In some instances an increase of cottage accommodation might be of advantage; and it might be of great advantage to many farmers to erect covered sheds for holding a large portion of the crop. The expense of thatching, especially owing to the increasing value of straw, which is now being so largely used in the manufacture of paper, would be saved, and thus more than repay the interest on the buildings every year. The workpeople on these farms seemed to do their duty with energy and good-will, this, I believe, being caused in a great measure by the example of industry shown them by the energy of their employers. There is a dignity in labour; without this personal application there is no hope for success. I cannot close this Report without allusion to the immense benefits derived from these competitions. There is honour even in defeat. Like Antæus, the competitors may receive renewed strength from the earth after a fall, and rise refreshed for renewed combats. The agriculture of every district where these competitions take place is encouraged—a spirit of emulation is infused and fostered. The Judges themselves will frankly acknowledge that they are taught many profitable lessons from the varied experiences of new districts and new systems.

In the name of my colleagues and myself, I have to thank all the competitors for their uniform kindness during our inspection. The duties of judging are both difficult and arduous, and it is hard to give satisfaction to all; but we feel assured that in no district of England could we have met with a kinder reception, and at the same time have had our duties lightened by a more frank and manly spirit, than was shown by the farmers in every class of the competition, to all of whom we wish every success.

S. D. SHIRRIFF.
T. P. OUTHWAITE.
J. D. OGILVIE.

XXV.—*Report on the Liverpool Prize-Farm Competition*, 1877 —*Dairy and Stock Farms.* By JOHN CHALMERS MORTON, Northchurch, Berkhamstead.

A REPORT of farm management which has been profitable during the past few years ought to have some interest for agricultural readers; and as ample profit has unquestionably been realised of late years on most of the dairy and stock farms which have competed for the Society's prizes at the Liverpool Meeting, a detailed account of the management, not only of Messrs. Lea and Roberts, Messrs. Mackereth and Hollingshead, and Mr. Edwards, who have been successful in the three several classes of farms, but of many others in those classes, who have been making money, while farm-tenants elsewhere have too generally been losing it, would, I believe, command attention. It is not, however, intended to do more in this Report than state so much of each case as has appeared to the Judges to justify their awards, prefacing the statement with some reference to the causes to which, as it appears to them, the general agricultural prosperity of the district, and the especial success of the winning occupations, have been owing.

Generally speaking, the prizes have been awarded to those tenants whose farm-management—at once of old standing and promising to last—has yielded the largest produce with most profit to themselves. And among the leading causes to which—apart from the principal conditions of climate, soil, and markets—their success and the general agricultural prosperity of the district are due, reference must be made (1) to the economy of labour, and (2) to the liberty permitted to the cultivator; both of which are remarkable in such parts of Cheshire and Lancashire as we have visited. Taking the latter of these conditions in the first place, we were not unfrequently told, on walking over a farm—some of it old pasture, much of it pasturage as good as if it were of old standing, and perhaps not one-half of it arable—"There is not a field but I can do with it just as I please; break up this old grass, or this ten-year-old pasturage as good as any of it; take wheat after wheat after wheat, if I think proper;

sell hay and straw and roots; do, in fact, whatever I've a mind to." In general, the two or three fields upon these dairy farms which had been grass immemorially were not within this liberty of the tenant. But the greater part of those dairy farms which we saw is not of this old grass, but of grass which has been laid down by the tenant, and remains unbroken for six, eight, or ten years, as he chooses. In some cases, however, no restriction whatever was put upon the cultivator; and the effect of this liberty in those instances which have come under our notice has been to quicken the whole management, keeping the tenant alive to the possibilities of profit in every direction—alive, above all, to the necessity of maintaining his land in the highest state of cleanliness and cultivation, in order to realise the greatest possible profit from the liberty thus given to him on his generally small occupation.

Take the case of Mr. J. Owen's farm, near Halewood, for example, in the class of dairy and stock farms between 100 and 200 acres — the size which represents the ordinary run of Cheshire dairy farms. This farm of 160 acres is held under two landlords, partly on lease and partly at will. What the conditions of the lease are we were not told; there is not a field on the place, however, we were assured, but the tenant can do with it and with its produce whatever he may choose. With full liberty to sell, and the best market in the world for agricultural produce of all kinds close by, the temptation—"to beggar the land?"—no, to maintain it in the highest possible condition, is irresistible; and accordingly we found heavy crops of clover, oats, and wheat, promising crops of roots and potatoes, and well-stocked grass fields—all clean and full of produce. The hay-making had been stopped by rain, but a very heavy crop was all carefully cocked and ready to be carried, finding its way ultimately to Liverpool. The heavy oat and wheat crops, too, showed the capital condition of the land—and here, also, nearly all the straw and most of the grain would find its way to market. Four hundred tons of stable-dung, brought from Liverpool, and some 200 cwts. of nitrate of soda, and 300*l.* worth of bought and home-grown food consumed upon the land by stock, which is bought wherever cheap enough and sold whenever fit:—These are the guarantees of permanent fertility. And this is the style of agriculture, at once prosperous and productive, which here comes of liberty accorded to an energetic money-making market-man, who knows practically the management of land and crops and live-stock on the soils and under the skies of Cheshire and South Lancashire. Other farms in his class were considered to come more perfectly, and with equally profitable results, within the conditions by which the Judges were instructed, and Mr. Owen, therefore, did not receive a prize; but his farm certainly may be named as an example of the advantage to farmer, labourer, and landowner alike, as well as to the consumer, of that liberty of action from which enterprise and energy in agriculture, as in other industries, can alone be expected to come.

Referring now to the economy of farm labour: the amount paid annually as wages on these farms, in a district where wages are far higher than the average of the country, is certainly surprisingly small. Take the cases of the first and second-prize farms in the same class as that in which Mr. Owen competes for example.—Mr. Richard Mackereth, whose farm of 112 acres, at Waterside, near Lancaster, receives the first prize in this very interesting class, pays less than 10*s.* an acre annually in actual wages for hired labour, on land of which one quarter is arable; and Mr. Charles Hollingshead, at Weaverbank, near Middlewich, Cheshire, who takes the second prize in this class, with a farm of 116 acres, pays only 6*s.* an acre, or thereabouts (not including, however, women servants in the house), for the hired labour of his farm, about two-sevenths being arable. The labour is, of course, virtually all done by the tenant and his family. "The mistress makes the cheese," he tells us, "the mother being now helped by her daughter; and I have two good boys of my own, and, with the help of one hired man throughout the year, we manage it amongst us." At the Waterside farm of 112 acres, there are 28 acres of arable land, cultivated on the four-course rotation. The land is full of stock of all sorts; 22 cows and 9 or 10 calves, and as many yearling's and two-year-old heifers; a flock of 80 ewes, lambed down and fed off; a lot of pigs, fattened from the dairy; upwards of 3 tons of cheese made annually; the whole place, land and premises and fences, clean and trim and neat; and the whole wages annually paid vary from 55*l.* to 60*l.* Mr. Mackereth has three sons—one lad of 16 had just returned home from school, and the education of all has been cared for; and with Mrs. Mackereth and her daughter in the dairy, and himself and sons in the field, not more than one hired hand, with an occasional day's help at harvest-time, is needed throughout the year. Mr. Charles Hollingshead, of the Weaverbank Farm, near Middlewich, whose words are quoted above, does not pay more than 35*l.* a year for wages, notwithstanding that of his farm of 116 acres no less than 34 are arable, and a large quantity of potatoes are grown. Here, too, there is a large dairy—33 cows milked daily, and pigsties full of fatting swine. Three sons here, too, have come into the labour-power of the farm. One, however, has now left, having got a farm of his own; and it is to this that they all look forward as the proper upshot and issue of the system. On both of these farms every help has been given by good management in the past, the fields having been thrown together in large, square, and well-fenced plots, and the premises arranged so as to hinder waste of labour; and by good management in the present, also, for all kinds of labour-saving machinery are in use. Good cultivating tools and mowing and reaping and threshing-machines are employed; and horse-power, being worked by the farmer or his sons, is employed early and late, without regard to regular hours, whenever opportunity offers or requires. And it is in this way that a very minimum of actual outlay on wages is incurred; while the land is at the same time kept in the very highest state of cultivation and productiveness. The system, wherever practicable, is one which insures farm profit, and therefore it insures the landlord's rent. And now, when the difficulty of obtaining labourers on the farm is almost everywhere complained of—especially the difficulty of getting labourers who are interested for their employers—it is not likely that this most satisfactory way of avoiding it will be suffered to die out.

No landowner will fail to lend whatever help as landlord he can offer to a prosperous and energetic tenant, whose family, holding together and working steadily for the common end, thus escape that growing and excessive cost of hired labour which is threatening to affect the value of the land to rent. There seems only one objection to the system. Few would desire to see the land in the hands of uneducated tenants who are merely moneyed labourers; and it is not without reason, therefore, that I have quoted Mr. Mackereth's care for the education of the sons who are helping him, as one among the merits of his management. Another objection to the system may indeed occur to some, that if every farmer rears all his sons in this way, it must ultimately lead to excessive competition for land, and therefore to excessive rents. This, however, may be left to correct itself, especially in a country like ours, blessed with colonies, for which the younger sons of farmers, thus accustomed to all kinds of farm-work, and ultimately receiving their share of the general savings, must be the best possible immigrants.

The only other general conditions affecting farms in the Liverpool district to which any preliminary reference need be made are those included under climate, soil, and markets. A dense population collected in large towns scattered throughout a county necessarily modifies its agriculture. Manure can be purchased more cheaply than it can be made, when large towns are near; and produce then commands a higher price in the market-place than can be made of it by consumption or conversion at home. These two circumstances convert the farm into little other than a market-garden, even though it be agricultural crops exclusively—as wheat and oats, and clover, turnips, and potatoes—that are grown upon it, for the whole produce goes straight to market; unless, indeed, the landowner insists, against his own interest, on the maintenance of rules which were made for altogether different circumstances. Even on dairy and stock farms these two circumstances also exert a very obvious influence. Early potatoes, grown for immediate sale, and large farm-gardens, full of marketable produce, receive exceptional attention. Milk and butter, too, take the place of the ordinary cheese-produce of the Cheshire dairy, and thus the ordinary agricultural management is altogether upset.*

The climate and soils of a district so large as the counties of Lancashire, Cheshire, Flint, and Denbighshire, necessarily vary between wide limits. The farms upon our list lie fully two degrees of latitude apart, and include 700 feet of difference of elevation. They lie, too, on subsoils as various as the sands and marls of the New Red Sandstone, the clays and sandstones of the coal measures, and the clay-slate of the Cambrian system. Over all, however, there is one condition which generally obtains. The climate and the soil together lend themselves admirably to the growth of "artificial" grasses; and everywhere bone-dust as an application, at the rate of 8 or 10 cwts. per acre, possesses an efficacy as manure, especially on grass-lands, unknown to the eastern and southern counties of England. The early establishment and long-continuance of sown grasses is probably the most characteristic and influential of all the agricultural features of the district. Fields sown down three to six years ago already have all the appearance of permanent grass-lands, and, retaining their excellence much longer—arriving, indeed, much sooner at that period in the history of a new grass-field, when, under good management, it begins continually to improve—there is no temptation to plough more than a comparatively small portion of a farm; all, or nearly all, of which may, nevertheless, be within the power of the tenant to cultivate just as he may choose. This, it will be seen, in the case of many of the farms to be described, is one of the most influential of all the circumstances on which the agriculture of the district depends. I may add, as regards the arable portion of the farms, that the whole of the district seems also adapted to the growth of swedes, and the Judges found generally excellent crops of this root.

I now proceed to the description of the successful farms.

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* The abundant supply of cheap feeding-stuffs in the great port of Liverpool, such as Indian corn, cotton-cakes, &c., leads to their being very largely used in this district; and to the consequent increase of its fertility.

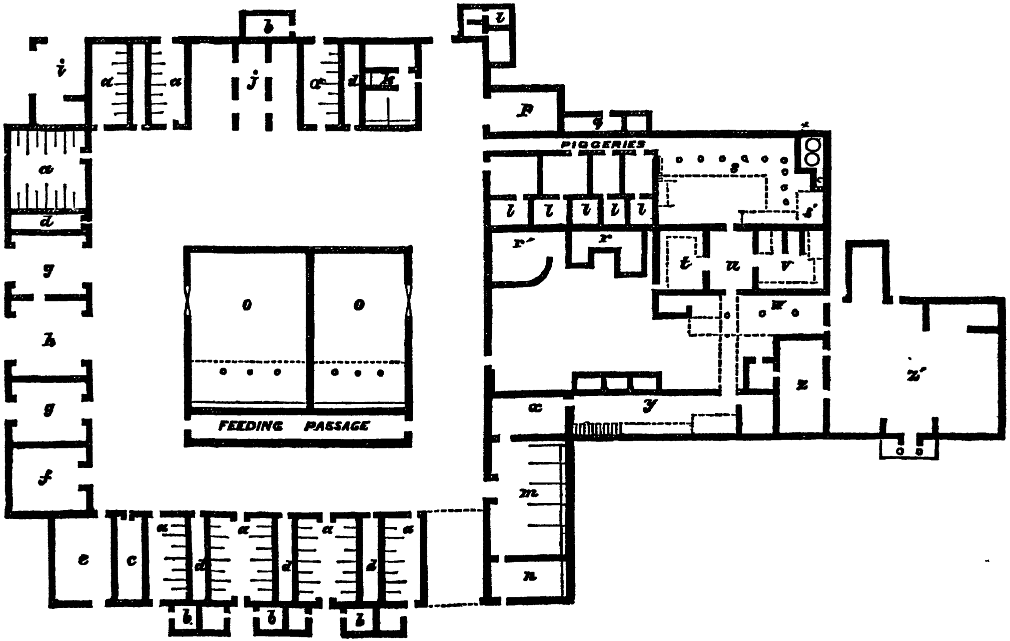
CLASS IV.—STOCK AND DAIRY FARMS OVER 200 ACRES.

Of the holdings in the fourth class of the Liverpool Farm Competition, including stock and dairy farms over 200 acres in extent, two are distinctly foremost for the profit realised on them, and the quantity of food sold off them. One is a true Cheshire dairy farm, the other is remarkable for its yield of meat. Both of these farms come within the terms of the classification, and yet their management, directed to altogether different ends, is necessarily as different as possible. In both cases, indeed, it is energetic, intelligent, and successful; in both the land is clean, well-cultivated, and productive; the farm roads and premises are in good order, and the land carries a surprising quantity of stock; and in both cases a liberal expenditure in manures and cattle foods is incurred, a heavy rent is paid, and the labour of the farm is skilfully and economically directed. The nature of the produce, and the character, therefore, of the management, are, however, so different, that it was found impossible to subject them to any such comparison as would place the one above the other on the scale of merit. The award has, therefore, placed them "equal first."

Stapleford Hall, near Tarvin, the property of the Rev. Thomas France Hayhurst, of Davenham Rectory, Northwich, and for the last nine years in the occupation of *Mr. John Lea*, is 250 acres in extent, of which about one-half is arable, only 70 acres, or thereabouts, however, being annually under the plough, the remainder being either permanent grass or grass laid down by the tenant, and from two to ten years old. It lies on the marl of the New Red Sandstone formation, or on the gravel beds by which that formation is in many places covered, and the soil is heavy and cool, or light and occasionally "burning," accordingly. The farm is held on a lease of 11 years, now nearly expired, which limits the extent of land that may be ploughed in any year, but places no other restriction on its cultivation. Mr. Lea takes an oat crop after his grass, ploughed up at from two to ten or twelve years old, according to its condition; and this is followed by a fallow crop, mangolds, swedes, turnips, or beans. These again are followed by wheat, and this by oats, in which clover and grass seeds—5 lbs. of red clover, and as much of mixed alsike and white clovers, with half a bushel of Italian, and as much of Scotch rye-grass, are sown. The farm-manure, with a dressing of artificial manure, is applied to the green and fallow crops. An occasional dressing of bone-dust, 10 cwt. per acre, is put on the clover. Two or three cwt. of bone-meal is almost always applied to clovers in their second year, and the second grain crop sometimes receives a dressing of nitrate of soda. The clovers and grass-seeds very soon form an admirable pasture, hardly distinguishable from good old grass, and they remain down as long as the tenant thinks proper. Of the whole 250 acres, about 120 acres are in permanent grass, much of this being low-lying meadow-land, which Mr. Lea has drained, and which he mows every year. The fields have been thrown together in 20 and 25 acre plots, many crooked fences have been removed, and great lengths of new straight fences have been made, quicks having been planted and protected by strong wooden posts, with rail on top and two wires beneath. The premises, of which a plan and index are given on p. 507, provide ample accommodation for the stock of all kinds, and for their winter fodder. In the engraving, the large open square is represented as occupied partly by yards and shedding. This exists, as yet, only in design. The proposed alteration will be a great improvement, for at present there is a great surface on which the manure lies exposed to the rain; and as the buildings are not spouted, there is a considerable escape of liquid manure, which might, indeed, be directed into a stream, and flushed over one of the lower fields, but which at present runs to waste. The house and dairy accommodation is convenient and roomy. The garden is probably one of the most profitable farm gardens in the island; large quantities of fruit and vegetables, and mangold seed from selected roots, being grown for sale.

The live-stock of the farm—confined to cows, young stock and pigs—include 70 to 80 dairy cows, of a useful Shorthorn type. Twenty young heifer-calves are reared each year, and as many drafts of the poorest milkers and the older cows are sold off each year. The heifers are put to the bull at 16 months old, and are brought into the herd early in their third year. They are a useful lot of common Shorthorns, and are improving in Mr. Lea's hands. For his latest purchased bull, bred by Mr. George Phillips of Shropshire, he gave 52 guineas at the Bingley Hall sale, Birmingham—having taken the first prize in his class there. This show-sale appears to be in many instances attended by the Cheshire dairy farmers. The produce of the cows is about 4 cwt. of cheese annually, besides about 20 lbs. of butter apiece, a considerable quantity of the milk also being sold from them in December and January. Both the latest and the earliest milkings thus go into Liverpool, at prices varying from 10*d.* to 11*d.* a gallon on the farm. All the earliest bull-calves also are fed, and there are generally 20 to 30 fat calves sold early every spring, at prices varying from 3*l.* to 5*l.* apiece. Besides these, upwards of 400*l.* is received annually from the sale of draft-cows; and there are 50 fat hogs of a good middle-sized

Fig. 1.—*Plan of Mr. Lea's Homestead, Stapleford Hall, Chester.*



a, a, a.	Cows.
b.	Calves.
c.	Bulls' house.
d.	Fodder.
e.	Roots.
f.	Loose-box.
g.	Mixing-room.
h.	Straw.
i.	Implements.
j.	Cart-shed.
k.	Saddle-room and Nag-stable.
l, l.	Pigsties.
m.	Cart-stable.
n.	Hospital.
o, o.	Open Yard.
p.	Coach-house.
q.	Tools.
r.	Poultry; *r'.* Coals.
s.	Shed; *s'.* Whey.
t.	Milk-house.
u.	Churn-room.
v.	Dairy.
w.	Shedding.
x.	Stores.
y.	Drying-room.
z'.	House; *z.* Pantry.

[In addition to the spaces *d* between the cow-byres, the "tallet," or second floor, over the whole range of cow-houses, is filled with hay, straw, and corn. The cheese-room occupies the second floor, over *x* and *y*, which are severally the Store-room and Drying-room belonging to the House.]

white breed, which average 7*l.* apiece, half being bred on the farm (2 sows are kept), and half bought as young stores, at about 1*l.* apiece. The other receipts from the farm come from 20 to 25 acres of wheat, 30 to 40 acres of oats, and 6 acres of potatoes; also from the sale of 30 tons, or more, of hay and straw every year, and from the poultry-yard and garden, both of which are most profitably productive.

For an outlying dairy farm, with no special market advantages (it is seven miles from Chester) the Stapleford Hall farm appeared to the Judges to be fully rented. The labour bill includes, besides about 400*l.* paid directly as wages, the board of three men in the house. And nearly another rent is paid in purchased cattle-foods and manures. The land is worked with two pair-horse teams, an odd horse and a hack; and a colt is reared most years, for which a good price is ultimately obtained.

We had the pleasure of walking over Mr. Lea's farm on three occasions, in December, May, and July, respectively. On the first occasion, most of the cows were still more or less in milk. They were receiving uncut roots, hay, and straw in the stalls, besides about 150 bushels of grains weekly; and 35 gallons of milk were sold daily at 10*d.* a gallon. Cheese-making had ceased some time, and would not be resumed till March. There was a capital lot of 8 to 10-months-old heifer-calves in the sheds, and of yearlings in the fields, the latter 3 to 5 months gone in calf. The young wheat was looking well.—In May the cows were in full milk. They had received some ground oats, Indian meal, and cotton-cake, after calving, along with mangolds and hay, until turned out to grass. The fields were full of growth; the wheat and oats most promising; the potatoes had been got in well; there was a capital lot of fatting hogs in the sties.—In July the wheat and oats bid fair to realise all their promise. The former has certainly turned out a great crop. Potatoes were strong and full of healthy growth. Mangolds nearly covered the ground. Swedes, in various stages, were coming on, some already thinned, others suffering from the fly. The clover had been cut and made, and Burgess and Key's mower—in its 11th year—was making capital work in the meadows. The cows were receiving about 2 lbs. of undecorticated cotton-cake apiece on the grass, a practice which might be carried out on a more liberal scale, for it increases the milk and improves its quality, at the same time economising the grass, and improving both the land and the stock upon it. This year's calves were not looking well, being weaned on whey. They receive new milk for three or four weeks, and then get whey, along with oil-cake meal and hay and grass. The food was purging them, and several of them looked badly.

The dairy was in full operation, under the management of Mrs. Lea and her daughters. Arriving at six in the morning, and remaining till noon, we saw the whole process, as it is carried on in a Cheshire dairy. All hands were milking, one to every seven or eight cows. The cream off the evening's milk and the warm morning's milk were poured together through the sieve into the evening's milk, which, after being skimmed, had been poured into the tub, and they were stirred up together. The rennet, made yesterday, a quart of water in which two pieces of dried vell, cut about the size of the palm, had been soaking for 24 hours, was poured into the milk at about 83° of Fahrenheit, and the curd (covered up if it be a cool morning) comes in about an hour. The tub, about 9 feet long, 30 inches wide, and 26 inches deep, holding 300 gallons, when conveniently full, is provided with a waste-pipe at one end, and was about two-thirds full. The curd was slowly cut with a square cutter, in which the meshes are three-quarters of an inch square. This—the cutter being lifted and dipped always in a new place until the whole is thus cut—takes about twenty minutes; and after being left for an hour, the whey is baled and drained out, an upright sieve, protecting the exit, being first fixed in its place. As soon as possible, the curd, cut in larger pieces as it gets firm together, is lifted and put on a cloth over a latticed false bottom, placed beneath it in the tub, enabling the more perfect drainage of the whey from it. It is here again cut up, and then salted as ground, panful after panful, and packed in the cheese vats, tin ekes being used which hold it considerably higher than the woodwork. The salt was supplied at discretion during the grinding, but it was found that 4 lbs. had been used in nearly three cheeses of barely 70 lbs. each. The whey, draining off to its cistern close by, yields about $\frac{3}{4}$ of a pound of butter weekly from each cow. It is drawn off as required for the pigs, being used for them along with scalded Indian meal.

The work of the dairy is constant for every day in the week, excepting only what postponement of cleaning operations may be possible on the Sunday; the principal part of the work is, however, concluded by noon. The cheeses are not subjected to any heating in the so-called oven, which is a common practice in Cheshire dairies, nor is there any scalding of the curd in the tub during the manufacture. After three days in the press—during which (skewered at intervals through holes in eke and vat, left to facilitate the drainage of the whey) it is taken out and turned daily—it is ironed, bandaged, taken to the cheese loft, and there turned daily, until ready, in about six weeks, for sale. We did not think Mr. Lea's cheese to be of the first quality, as regards texture or taste; but in this matter no doubt the demands of the market it is made for are consulted: and a cheese of closer texture would not, we were assured, have suited the Manchester taste. Good prices had indeed been made. Two lots of this year's cheese had been sold at 78*s.*; 71*s.*, 77*s.*, and 75*s.* were realised, for early, principal, and late makes, in 1875; and 67*s.*, 71*s.* and 73*s.* for the corresponding makes of 1876—these being the prices per cwt. of 121 lbs.

It is to the credit of Mr. Lea's management that he has eradicated a couple of miles of ragged and crooked fences during his tenancy, and made more than a mile of new fences; quicks and posts and rails being supplied by the landowner. He has also spent 200*l.* in draining,—120,000 three-inch tiles, given by the landlord, having been placed in drains 3 to 4 feet deep; and he has also done a good deal, by embankment and by straightening a crooked watercourse, to protect the lower lands from inundation.

Of the workmen on this farm, three have cow-plots attached to their cottages—fields of from 2½ to 4 acres of land in grass—besides good and large gardens around the houses. A cottage and 4 acres let for 16*l.* a year; two others, with 2½ acres each, let for 8*l.* a year each. On the larger of the plots two cows are kept, and a calf is reared, and one is fattened, a yearling heifer being put out to tack, costing 35*s.* from May 12 till October 10. The receipts are derived from milk for the family and butter for sale, and the calf fattened, and the heifer reared; and the produce and the industry alike are a wholesome thing both for the rearing of a healthy family and for the attachment of the family to the place.

The instructions to the Judges of the farms appeared to them to give a preference to the dairy style of farming, and they would have awarded the first-prize exclusively to the Stapleford Hall Farm; but its management—good and profitable as it undoubtedly is—beautiful, indeed, from the rose-blossoming lawn in front of the house, and the fruitful garden behind it, to the very utmost of its neatly-fenced and well-managed fields—was not without its imperfections, as our Report has shown; and the management of the Well House Farm, Saltney, in Chester, with its enormous yield of beef and mutton and wheat, was also so good and profitable, that it appeared to us to deserve an equal place.

The *Well House Farms*, close to the Broughton Hall Station, on the Chester and Mold Railway, are in the occupation of *Mr. John Roberts*, as the yearly tenant partly of the Right Hon. W. E. Gladstone, M.P., and partly of Mr. S. K. Mainwaring of Otley Park, Ellesmere, Salop. They include close on 400 acres of alluvial land, of which 300 are arable, and 100 permanent pasture. There is an agreement between the landlord and the tenant by which the former has it in his power, whenever he may choose, to enforce the four-field rotation; but, practically, the tenant has unrestricted liberty of cultivation. He has himself laid down to grass many of the lower fields (112 acres in all) of this generally level land which are most liable to inundation, and they will remain permanently in grass; but the usual practice has been to keep the land laid down in grass for two or three years. Twelve lbs. of Italian rye-grass, 4 of red clover, and 2 each of alsike and white clovers and trefoil, are sown per acre. Nearly all the farm-manure, estimated at 1200 tons, is put on the young grass-seeds early in the autumn, some being retained for the mangolds and potatoes. The crop is mown the first year, and in the second nothing can exceed the abundance and excellence of its produce, as we saw it in July—a perfect carpet of white clover and alsike. When ploughed up, it is followed by either oats or beans, and these by wheat, after which a green crop is taken—some 40 acres, half mangolds, and the rest potatoes or swedes. These are followed by wheat, with seeds sown down again among it. All the root-crops receive, at a cost of 45*s.* per acre, about 6 cwts. of Proctor and Ryland's special bone manures, part applied when the land is ridged, the remainder after the turnips or mangolds are singled. The mangolds receive in addition 10 to 15 loads of dung in the ridges. Of 300 acres of arable land this year, there are thus about 80 in wheat, 20 in oats, 20 in beans, 40 in green crops, and 140 in grass of various years. The wheat, chiefly Nursery, with some Golden Drop, has been this year a great crop; the oats and beans not quite so good. The potatoes (Skerry Blues and Paterson's Victorias) looked admirable in July, when there was a great promise of both mangolds and swedes. The two-year-old grass was quite remarkable for its excellence; and a fair crop of clover was being made into hay.

In December we had seen the stalls and sheds and yards full of fatting beasts, besides calves and yearlings. In May, a month before the annual sale, we saw most of them ready for the butcher. The annual sale of 70 or 80 fat beasts, and 200 to 250 sheep and lambs, realising (with wool) from 2600*l.* to 3000*l.*, is the event to which the whole year's management leads up. This, and the produce of 70 or 80 acres of wheat, and a certain sale of straw and hay, if after the sale any remains—together with certain receipts from potato-growing and from horse-breeding—make up the annual returns from the farm. The outlay, besides a heavy rent, and nearly as much spent in labour, and 600*l.* to 800*l.* spent in cattle-food and manure, includes also the sum spent in the purchase of young stock and of sheep.

The live-stock of the farm in the month of May included 14 cows, well-selected Shorthorns, and 16 two-year-old heifers, all suckling their calves in the field; the latter, except some selected to keep up the stock of regular breeding cows, being put dry as soon as possible, and thereafter growing into heavy three-year-olds for next year's sale. There were also some 60 or 80 yearlings, of which 16 were heifers soon to be put to the bull—rearing a calf as two-year-olds, and sold fat at three. There were also about 70 cattle—coming two or coming three-year-olds, with one or two draft-cows among them—being fed in stalls and yards for the sale immediately ensuing. Calves are bought all through spring and summer, as there is room for them. They suck two to a cow at a time, being brought to them twice a day for the purpose, Mr. Roberts himself superintending the work: sometimes a favourite calf is allowed to run with its dam. No milking is done on the farm. Sixty to 80 calves are thus reared every year; 16 heifers of the home-breds being chosen to breed from, taking the place of the two-year-old heifers, which, having suckled their calves, are dried off and fed for the next year's sale. Some of the more forward yearlings have been brought out fat at the June sale, and made as much as 24*l.* at 16 or 17 months old; but this practice will not be continued. The cattle sold average generally about 29*l.* each, the great majority being just over two years old. Sixty-eight beasts made 1957*l.* 10*s.* last June, 81 made 2273*l.* in June, 1876; and the sum received for the sheep and cattle together varies from 2200*l.* to 2600*l.* annually. The calves have access to cake and ground beans and hay, from the very beginning of their weaning. They are reduced to a single meal of milk daily at 5 or 6 weeks old, and are entirely weaned at 9 or 10 weeks old. They are kept in yards through the summer, and in sheltered sheds in the first winter, 10 or 12 together, and are fed on grass, receiving 3 lbs. apiece of cake and meal, with hay and whole roots during winter. They are at length put out on capital two-year-old clover, receiving and generally requiring nothing else till the following autumn, when they are taken into yards again, receiving, with swedes and straw, 5 or 6 lbs. of mixed Indian corn and home-grown oats and beans, a quantity which is gradually increased, until, in March, April, and May, before the sales, they are getting 10 or 12 lbs. of mixed meal and cake, in addition to mangolds and hay. It appears likely that, as the system adopted by Mr. Roberts aims at bringing the young cattle out ripe at an early age, and his winter feeding with corn and cake is very liberal, it would pay to continue a small allowance of corn or cake through all or part of the time when the cattle are on grass. Any check in their continuous growth would thus be avoided. There is steam-power on the premises, by which all the necessary grinding and chaffing is accomplished. There are two sets of buildings, and ample accommodation in yards and stalls and sheds. The water-supply is admirable, a bore of 70 feet reaching a water-bearing stratum, whence the water rises and pours out, at a level some feet above the ground.

The sheep stock include a flock of 150 Shropshire ewes, which produced last year 220 lambs. All the lambs not sold fat are shorn in July; and some 60 ewe-lambs are put to a Cheviot ram in October and November, and are sold with their lambs fat in the following summer; the annual sale including a large number of sheep of all ages—old ewes and lambs, and shearhogs, and shearling ewes and lambs. The home-bred calves are very good. Mr. Roberts has a few very good Shorthorn cows, and he employs a well-bred bull. The bull lately employed was purchased at Berkeley; and he has this summer been a buyer at the Elmhurst sale, having secured two bull-calves by Mr. Fox's "2nd Duke of Airdrie" at 40 guineas each. His purchased stock is not so good as that of his own breeding. Seven horses, of a capital Clydesdale stamp, do the work of the farm, and there are several young horses bred, for which long prices will be obtained. Mr. Roberts adopts steam-cultivation to some extent, paying about 70*l.* yearly for steam cultivation of the wheat and bean stubbles. Three men and a boy work with the horses; two men and two boys attend to the live-stock in the stalls and fields; and two other men are employed, besides occasional labourers, in harvest. The men receive 18*s.* a week, a cottage and potato-ground, and 50*s.* harvest-money; as much work as possible, however, being let by the piece; as turnip-hoeing (three times) for 12*s.* an acre, and root-pulling, trimming, and loading, for 14*s.* an acre. Mr. Gladstone has some capital cottages erected on the Well House Farm. The farm produces an immense quantity of bread and meat. The oats and beans grown on it are almost entirely consumed at home, but there is a large sale of wheat, and this, with the surprising yield of well-fed beef and mutton, marks it out as deserving quite a foremost place. A good road runs through the midst of it. The fields are drained into the deep ditches which surround them; the fences are straight, well grown, and well kept. The land is clean. Buildings, house, and cottages leave little to be desired. The natural fertility of the land is increasing year by year under Mr. Roberts' liberal and energetic management. An iron plough, polished bright as silver, hangs against the kitchen-wall, the gift of Mr. Gladstone, who appreciates his tenant; and the walls of one of the sitting-rooms are covered with prize-cards (we counted more than 100), showing in how many previous contests Mr. Roberts has been successful. He well deserves the front rank which has been awarded to him here.

Beside the Well House and Stapleford Hall farms, the Judges saw good management on several other farms of this class, two of which certainly well deserve the commendation which we awarded them.

Mr. Robinson, of *Lee Green Hall*, Middlewich, occupies 257 acres, the property of R. H. Done, Esq., of which 50 are under the plough, 17 being wheat, 22 oats, 6 swedes, 2 potatoes, and 3 mangolds, all of admirable promise when we inspected them in July. There were also 17 acres of capital young seeds, and as much of two-year-old seeds, beside several fields also laid down by the tenant, which had been many years in grass. The farm is worked by 5 horses, two of them mares with foals. A herd of 75 cows, fair Shorthorns, produces from 14 to 15 tons of cheese each year: all the heifer calves, up to April, are reared each year, and the early bull-calves are fattened. A number of the older cows are fattened off and draughted annually. The cheese was the best we tasted on our round, excepting only that of Mr. Jackson, at Tattenhall, on whose farm, afterwards withdrawn from competition, a cheese-factory had been established. The very excellent premises at Lee Green Hall had been greatly improved during the tenant's occupation, and partly at his expense. The arable land was well managed. The swedes were the best we saw, unless, indeed, it should prove that they were too forward; which, however, was not likely in the cool, moist climate of the district. The oats were a remarkable crop, and wheat very good. Mr. Robinson had done a great deal to eradicate old fences; some 3 miles had been rooted up, and a mile of new ones had been made. Beside the cows, eight or nine sows are kept in connection with the dairy, and their produce is reared and fattened, the later litters being sold as stores in the autumn.

About 500*l.* worth of purchased and home-grown grain and cake and Indian corn, and 150*l.* worth of bought manure, and some 240*l.* a-year in wages, besides the rent, represent the chief outgoings of Mr. Robinson's farm. His receipts are derived from 14 to 15 tons of cheese, 17 or 18 draft-cows, 200*l.* worth of pigs, and a certain sale of hay and straw. There is also a small flock of sheep. Here, too, as generally on Cheshire farms, there is a considerable receipt from both poultry-yard and garden. The latter was full of produce and apparent profit.

Mr. Kendall's farm, about 310 acres, the property of the Earl of Derby, at *Harbarrow*, for the most part a bare unsheltered district, near Ulverston, is, one-third of it, in permanent grass. It is provided with a capital farm-house and premises, including a noble hay and corn barn, open to the north and east, capable of holding 6000 cubic yards, and costing 350*l.* The stock, when the Judges saw the farm in December, included 21 large Shorthorn cows in-milk, 14 calves, 25 yearlings, 15 two-year-olds, and 16 fattening cows and steers. The arable land is being gradually diminished, it being Mr. Kendall's intention to lay down enough land to keep 25 cows and their produce, fattening them off as grazers in the third year. The farm is worked by 6 capital horses, one or two of them being mares, generally with foals. Very full and explicit accounts are kept by Mr. Kendall, and it would be profitable to relate his experience in full detail. It must, however, suffice to say that the receipts from the farm are derived from a sale of between 2000 and 3000 gallons of milk annually, at 10*d.* a gallon, a considerable sale of butter, about 15 fat beasts annually, and from 100 to 200 fat sheep, besides the produce of the corn fields and a certain amount of straw sold. The outgoings, beside rent, include wages, about 200*l.* a year (not including the board of four men and three women in the house), about 100*l.* a-year spent on manure, and some 600*l.* spent in purchased and home-grown cattle-food. The best-conditioned lot of calves and yearlings anywhere on our rounds were seen on this upland and almost North-country farm. The two-year-olds grazing in the lower pastures were also capital thick-fleshed Shorthorns. There is a very good small herd of Shorthorn cows, on which a pedigree bull is used. One particularly good Shorthorn cow had been purchased, and was being fed for Christmas show. The arable land is well managed; the swedes are grown in drills upwards of 30 inches wide, on 6 or 7 cwt. of Hill's turnip-manure per acre; the dung is all taken either to fallow for wheat, when it is intended to sow permanent grass-seeds among it, or to the land after turnips for barley or for wheat.

Of the other farms in this class, it must suffice to merely name them. *Scale Hall* farm, near Lancaster, is in the occupation of *Mr. J. Woodhouse*, who does a large business in the provision of milk; about 100 gallons daily are sent out, and a stock of 50 or 60 useful Shorthorn cows, some of them pedigree animals, are kept for the purpose, on a farm of 210 acres, two-thirds of which is permanent grass. There is here a large consumption of purchased cattle-food, and upwards of 30,000 gallons of milk are sold annually at an average price of 8*d.* per gallon; 17 to 20 fat and draft cattle are also sold at an average price of 20*l.* More than 20 heifer calves are reared annually and brought into the dairy at 3 years old. There is a small but very useful flock of Leicester sheep, and an annual sale of mutton and wool, varying from 300*l.* to 500*l.* a-year. The arable land occupying the lower fields is fairly managed. The farm carries a heavy rent, and pays a great labour bill.

Mr. F. Harrison occupies at *Hutton Grange*, 455 acres of alluvial land on the south side of the Ribble, four or five miles below Preston, only 155 acres being embanked from the tide, to which all the rest is exposed. It is all grass-land. About 50 fat cattle and some 300 fat sheep are sold every year. Two dozen cows are milked, and some 3 tons of cheese and 120*l.* worth of butter are made annually, some of the milk going also to the rearing of the calves. The inclosed land is improving under the system which continually feeds them from the marsh land beyond the embankment; for the sheep kept on the river-side marshes during the day are always driven to these enclosed fields at night. The farm is remarkable for a very complete set of buildings, apparently beyond the needs of the occupation. Ranges of mangers are fed from tramways in the gangways alongside of them, on which Willacy's self-acting apparatus for supplying the cattle with cut-roots as it passes along may be employed.

Mr. Thomas Borthwick's large farm at *Nantywrach*, over 700 feet above the level of the sea, on the high-land in Denbighshire, between Colwyn and Llanwrst, must not be omitted from my list, notwithstanding that he desired to withdraw from the competition. A great deal has been done here to improve the land by fencing, roads, and sheltering plantations; and the tenant, who has large dealings in the cattle-trade, keeps the land well stocked with cattle and sheep suitable to the bleak uplands which he occupies.

CLASS V.—STOCK AND DAIRY FARMS OF 100 TO 200 ACRES.

The fifth class of dairy or stock farms, which includes all those between 100 and 200 acres in extent, represents the ordinary run of Cheshire and Lancashire dairy farms, and there were no fewer than eleven entries. Of these, the Judges placed Waterside farm, in the parish of Ashton cum Stodday, near Lancaster, in the occupation of Mr. Richard Mackereth, first; and Weaverbank farm, near Middlewich, in the occupation of Mr. Charles Hollingshead, second; and Mr. Peter Percival, of Hall Lane farm, between Warrington and Runcorn, was commended.

Waterside Farm is about 2 miles from Lancaster, and 112 acres in extent,* lying between the higher ground close by the Ashton Hall Park and the edge of the tidal river Lune. Four fields, in all 29 acres of free alluvial soil lying by the river-side, are cultivated on the four-course rotation—green-crop (chiefly swedish turnips, with an acre or two of potatoes), wheat, seeds and oats. The land was perfectly clean, and the crops, especially the green crops, were very good. The grass-land, which, with the arable, has been drained wherever necessary by the tenant (the landlord providing tiles)—full of good and useful growth—has evidently improved under Mr. Mackereth's management. A long and narrow piece belonging to another proprietor, which, with a right of way to it, lies in the very midst of the farm, shows by its condition the original unimproved condition of the pasture.

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* There is also an outlying field of six acres of grass-land in Mr. Mackereth's occupation, a mile or two away, which we did not see.

The grass-fields are all provided with drinking-places, natural springs or drainage-water having been used to supply small troughs on the level with a constant stream. There is a tidy little outlying homestead with barn and tie-up house for cattle, small stable, and implement-house. Except this, there is nothing in the landlord's equipment of the farm calling for especial notice. Nor is there anything requiring engravings or illustrations to accompany this description. A plan of the farm now and at the commencement of the tenancy would indeed show how completely Mr. Mackereth has in that time re-arranged it. But it will suffice to say that the 45 fields which he found are now only 23 in number, and that 2½ miles of old fences have been removed, and new fences in most admirable condition—for which quicks and posts and rails were allowed by the landlord—have been substituted for them. Straight lines of perfectly clean and well-grown thorn fences now divide the farms into fields varying from 7 to 17 acres in extent.

A very modest cottage-like farmhouse is in part surrounded by the cow-byres, which stand under a lean-to roof against its walls. The pigsties are not far off, and the drinking-place for the cattle is also close by; and in winter the whole work of cow-feeding and dairy management is immediately at hand; but were it not for the cleanly and careful superintendence, a nuisance might easily be created. Some additional shedding is now being erected near the house: but, on the whole, the farm owes more to the tenant than to the landlord; and it is surprising to see the first place in so severe a competition won in a case where so little of the farm equipment deserves any particular praise.

Mr. Mackereth keeps what must, on the whole, be pronounced the best, and, for the acreage, the largest stock of cattle and sheep which the Judges saw. There is an expenditure of about 1*l.* an acre in cattle-food and manure; and the two-year-old heifers, generally 10 in number, are put out to tack during the summer months, at a cost of 20*l.* to 30*l.* a-year; but, with the exception of this help, a herd of 22 capital Shorthorn cows, with all their heifer-calves reared up to three years old, is maintained—the draft-cows, 7 to 9 every year, being either sold when springing for calving at a high price, or fattened off and sold as beef. A flock of 70 or 80 Cheviot-ewes, purchased in Scotland every autumn, to which a North-country Leicester ram is put, are kept through the winter, and sold, ewes and lambs both fat, in the following year. A number of bacon-hogs are also fattened. The cows, large-framed Short-horns, are all of Mr. Mackereth's own breeding. He has used pure-bred Shorthorn bulls for many years. The bull now in use he purchased of Mr. Craggs of Ackholme, for 45*l.* when a calf. We saw on July 9 capital heifer-calves, 11 very good yearlings, and 9 admirable two-year-old heifers. Many of the ewes and lambs were already disposed of; 70 ewes had been bought in 1875 for 161*l.*, and they and their produce had been sold in 1876, 193 head, for 433*l.* 9*s.*, and in addition to this there would be 70 fleeces, averaging 4 or 5 lbs. each. The ewes run on the pastures in winter, receiving a few swedes before lambing, and plenty of swedes, with cake and corn, after lambing. As is inevitable where such a large flock of sheep is kept, eating the best of the grass, the make of cheese is not large—about 3 tons a-year. This is made on the Lancashire plan, and of the Lancashire size, varying from 3 or 4 to 6 to the cwt. No salt is put in the curd, but the cheeses, after two or three days' pressing, are placed in brine for a week, in which they float, going in soft at first and coming out hardened. They are taken thence to the cheese-room, and turned daily till ready for sale. They made 70*s.* a cwt. in 1875, and 73*s.* a cwt. in 1876.

Two horses do the home-work of the farm; there are also two young ones coming on; and, with the aid of one man receiving 20*s.* a week, the whole work of the farm is done by the farmer and his family, as, indeed, has been already mentioned in this Report.

Next to the stock upon the farm, the management of the green crop is the most praiseworthy feature. The Bangholm swede, originally Lawson's, has long been grown from home-saved seed, selected roots being planted out in a plot by the farm-house, where they can be easily protected. Remarkably large, well-grown swedes were being consumed in December; and in July, on the 7-acre green-crop field there were at least 5 acres of a perfectly even plant, soon to cover the ground, although sown in rows 28 inches apart, and singled out in the row with admirable uniformity, so far apart as 16 and 18 inches. There was also more than an acre of potatoes, chiefly Flukes; and a few mangolds, for which last, however, the climate is not suited. The swedes are grown on mixed artificial manure, at a cost of 5*l.* an acre. The farmyard-dung all goes to the young seeds and to the potatoes, 20*l.* worth of horse-manure being also purchased for this purpose. The oat and wheat crops, though even and clean—the young grass and clover coming up well among the latter—were not extraordinarily heavy, having suffered from the cold wet spring. The seeds, which had borne a good crop of hay, were providing useful keep for the sheep and yearling cattle. Two bushels of permanent and one of Italian rye-grass, with 13 lbs. of mixed clovers, are sown per acre.—The farm garden contained trial beds of different sorts of farm root-crops, as well as fruit and vegetables for home use.—The great produce of beef, mutton, bacon, and cheese, together with a certain production of wheat and potatoes, with but moderate expenditure on bought cattle-food and manure and labour—the whole farm meanwhile improving in cleanness and fertility—justify the award of the first place to Mr. Mackereth's occupation.

Weaverbank Farm, in the parish of Minshull-Vernon, near Middlewich, to which the second prize in this class was awarded, is 116 acres in extent, of which 40 are arable. It is occupied and worked by Mr. Charles Hollingshead, his two sons, and a hired labourer—the labour of the dairy (there are generally more than 30 cows) being done by Mrs. Hollingshead and her daughter. The arable land is cultivated on the four-course rotation—wheat, clover, oats, and green crop (including potatoes, swedes, mangolds and cabbages). The wheat crop, varying from 6 to 9 acres in extent, according to the size of the field falling in its turn, and the potato crop, generally 4 to 5 acres of Regents and Skerry Blues, are sent to market: all other home-grown produce is consumed on the farm; and in addition to this, more than 100*l.* is annually spent (in 1874, 199*l.*) in cake and Indian corn for cattle and pigs; and 60*l.* to 70*l.* is spent annually in bone-dust for grass-lands, and artificial manure for turnips. Thirty-three cows are milked this year: 7 or 8 heifer-calves are generally reared and brought into the herd at three years old, as many of the older cows being fattened off. The earlier bull-calves are also fattened and sold. From 5 sows 16 or 18 hogs are annually fattened, and 30 or 40 young pigs sold as stores: the receipt from this source last year was 144*l.* The make of cheese varies from 5½ to more than 6 tons annually. Last year it was 5 tons 14 cwts. from 32 cows. The cheese is of good quality and had made at the last sale 79*s.* a cwt. When the Judges walked over the farm in July there was an admirable herd of large Shorthorn dairy cows in full milk, except two or three which had slipped their calves and would be fattened.

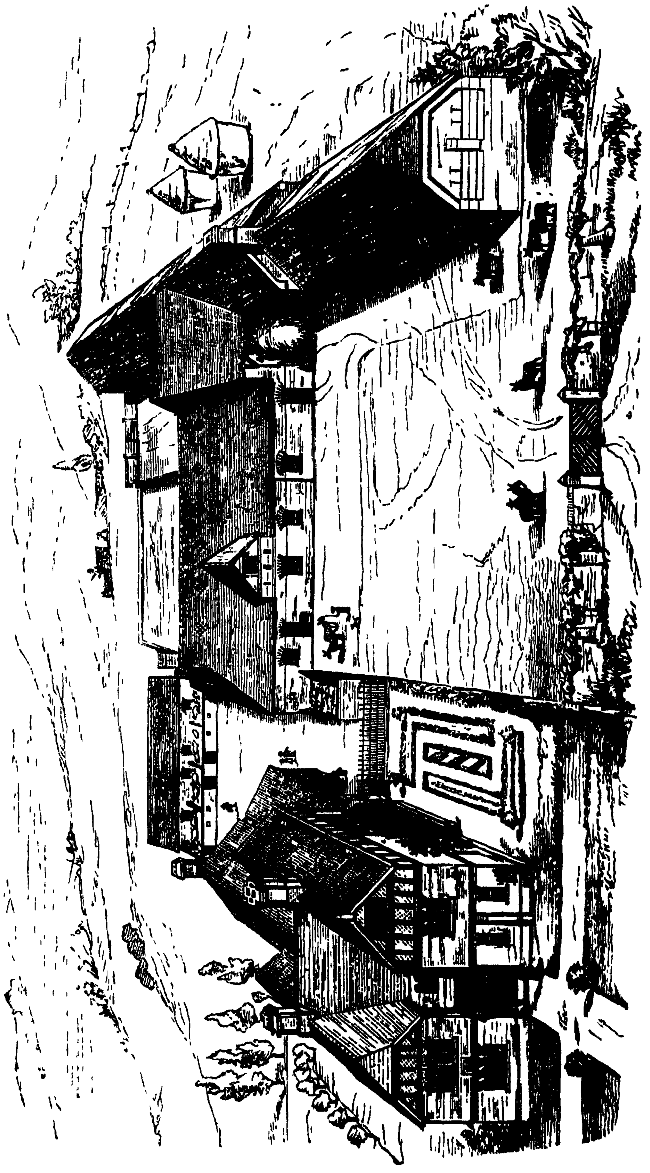
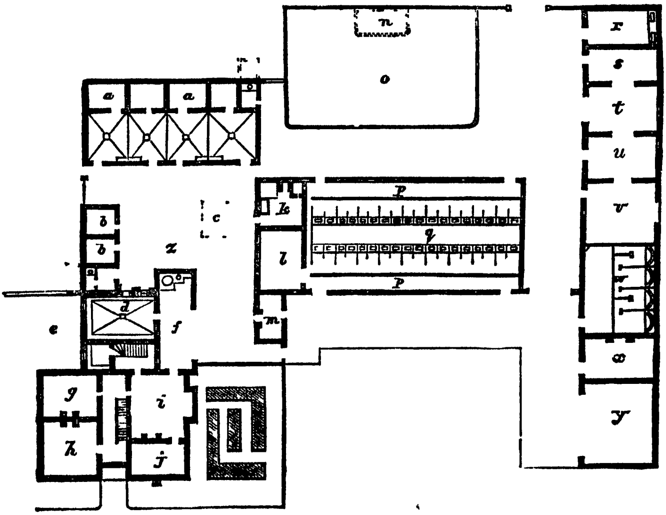


Fig. 2.—*View of Weaverbank Farm, Minshull-Vernon, Chester.*

A few only of the annual stock of calves had been weaned: there was a promising lot of yearling and two-year-old heifers. The cows at grass were receiving 4 lbs. daily apiece of mixed decorticated cotton-cake, Indian-meal and oatmeal. They get straw and turnips in the sheds in winter, and receive this mixed meal after calving. On the arable land the oat and wheat crops were very heavy; and the potato ground, with cabbages planted about among it, was covered with the promise of a great crop. The straight young thorn fences, clean and well kept, had the crops growing close up to them. The soil of the farm is for the most part a light and deep loam on the New Red Sandstone formation. The tenant had done a great deal to the improvement of the land by drains and roads and fences. The landlord also has provided admirable premises, of which a view and plan are given in Figs. 2 and 3. The plan and index need no explanation. The Judges nowhere saw better buildings, or buildings better adapted

Fig. 3.—*Plan of Buildings to Weaverbank Farm, Minshull-Vernon, Chester.*



a, a.	Piggeries.	*n*	Tank.
b.	Poultry	*o.*	Manure-yard.
c.	Tank.	*p, p*	18 Cows.
d	Milk-house.	*q*	Bin.
e.	Garden.	*r.*	Bull.
f	Shed	*s*	Bay.
g.	Parlour.	*t.*	Barn.
h	Sitting-room	*u*	Straw.
i	Kitchen.	*v*	Root-house.
j.	Press-room	*w.*	Stable.
k.	Boiling-house.	*x.*	Harness and Gig-house.
l.	Calves.	*y.*	Cart-house.
m.	Coals.	*z.*	House-yard.

to the land: and they were in perfect order on each occasion of our inspection. A tank is provided for the drainage from the stables and cowhouse, and the liquid manure is carted over the grass-land at proper times. Here, too, there is a farm garden full, as usual, of profit—everything, even herbs of all kinds, being grown for sale as well as for use. The greatest credit is due to Mr. Hollingshead and his family for their industrious and successful management of a thoroughly well equipped farm.

The Hall Lane Farm at Daresbury, near Runcorn, was commended. It is 124 acres in extent, of which 78 acres are arable. In December last we saw 49 beasts, closely packed in stalls, receiving four meals a day, each of these being ½ a bushel of turnips and 2 quarts of mixed meal (two-thirds Indian corn and one-third peas), with only such oat-straw in addition as could be picked up from the bedding. They were sold soon after, and made 22*l.* apiece. There were also 200 cross-bred Cheviot, Herdwick, and other sheep at grass, receiving a drumhead cabbage daily apiece; and as they were making 1½ lb. of mutton a week, Mr. Percival claimed that he was making 1*s.* 6*d.* a dozen of his cabbages. We also saw 30 or 40 great hogs, in a set of capital sties, fattening on scalded Indian meal in distillery wash. In July we saw in the grass-fields 33 cattle of various ages, which had been bought in April for 15*l.* each, and were then receiving sixpennyworth of decorticated cotton-cake apiece daily, and would soon be ready for the butcher. In the fields there was a large extent of wheat-crop—heavy and upstanding; a fair crop of oats; a remarkable crop of beans on land cropped last year with early potatoes succeeded by cabbages; thickly planted rows of swedes, to furnish plants to be transplanted into the potato land as soon as it was cleared; and some mangolds, rather patchy, and not free from thistle. There were also 18 acres of Dalmahoy potatoes in capital condition, on which a set of labourers were engaged, at 3*l.* an acre, in digging and sorting and washing (in the canal close by) a crop of potatoes, worth 50*l.* an imperial acre to begin with, for they were then being sold in the Manchester market at the rate of 15*s.* per Cheshire rod. The price would soon go down, as the market became over-supplied; but last year 31½ acres of potatoes had made 990*l.* The crop is taken after clover, which is ploughed in narrow ridges, the tubers being dibbled across them and covered with the earth from the furrows. It is followed the same year by either swedish turnips, pricked in on the removal of the potatoes, or cabbages which have been planted among them during their growth. Another crop of potatoes, well manured, may be taken in the following year, or oats may be taken, to be followed by green crop, and that by wheat and grass again. There is a large produce of wheat, generally a great produce of potatoes, and always an immense production of beef and mutton and bacon. Of course there is a large purchase annually of manure: the canal brings the Manchester scavenging stuff in barges close by, and some hundreds of tons are used every year. There is also a great quantity of purchased cattle-food of all kinds. The arable land is not all clean; but Hall Lane farm, only 124 acres in extent, with its 80 cattle and 200 sheep turned over in the year, and its 40 or 50 fat hogs, its wheat crop, and its great produce of potatoes, well deserves commendation for the quantity of food that it produces. In addition to all this, 45 tons of hay and straw were sold last year for 292*l.*

Although no formal award of commendation was made to any other farm in this class, there were many commendable examples of good and energetic management among them. To *Mr. Owen's* farm at *Halewood* reference has been already made in this Report. *Mr. Joseph Trickett's Moor Farm* near Sandiway—153 acres, the property of Lord Mansfield—has 40 acres of very productive arable land, covered this year with clean and admirable crops of oats and wheat, and mangolds and potatoes. There is a herd of 30 good dairy cows. Milk-selling has been given up, and butter-making adopted; and 600*l.* worth of produce, in butter, calves, and fat bacon (over and above the cost of meal), is made annually from them. There is also a useful flock of sheep; 50 ewes and their lambs being sold fat every year. A great deal has been done by the tenant in land improvement and good buildings.

At the *Horse-shoe Farm, Henbury,* near Macclesfield, *Mr. George Millington* farms 150 acres uncommonly well, about one-third of it is arable, some being a poor sandy soil. There is an expenditure of about 260*l.* a year in wages, and 400*l.* in purchased food and manure. Thirty to forty cows are kept, and a good Shorthorn bull is employed, the stock being kept up by 7 or 8 calves, and as many two-year-olds are reared; while the same number of cows are fattened or disposed of annually. There is an annual sale of 22,000 to 25,000 gallons of milk, realising 900*l.* to 1100*l.* The other receipts are for fat and store cattle, calves, and pigs; also for wheat and oats, potatoes, and a certain quantity of surplus hay. The cows are milked always two or three hours before the milk is consumed in Manchester, to which it is despatched without any preliminary cooling, the still naturally warm milk being preferred at Manchester breakfast- and tea-tables. There are good premises, and the farm is in good order and productive, notwithstanding the excessive quantity of rabbits by which it is overrun.

Mr. Beecroft, of *Upton Green* near Chester, has 125 acres in a rather scattered farm; and here, too, the milk is sold. About 30 cows are kept. Some useful horses are bred on the farm, and we saw some good wheat and green crops, and promising potato land.

In Denbighshire and Flintshire there were several farms in this class. *Geinas Farm*, in the parish of Bodfari, Flintshire, about 176 acres in extent, is occupied by *Mr. John Roberts*. It carries a flock of 180 Shropshire ewes; and a number of lambs, with 30 or 40 shearlings, and the draft-ewes are fattened off every year. There are also 12 good Shorthorn cows, on which a good bull is used. They yield butter for sale, and skim-milk for pigs, and their calves are reared. Two or three draft-cows in-calf are sold along with the two-year-old steers and heifers every year. The farm is well supplied with implements—double ploughs, mowing and reaping machines, Crosskill's clod-crusher, Howard's horse-rake, &c. A heavy rent and a heavy labour-bill, not to speak of the ravages of the rabbits, must largely detract from the profits of this hill farm, much of which is naturally poor.

On *Mr. Kinnersley's* farm at *Wernvawr*, near Ruthin, there are 150 acres, of which the greater part is arable. On our visit here in July, we saw a very large extent of promising barley, not yet, however, in ear, an unusually fine piece of peas, and some good wheat; good and neatly-kept premises, and good land.

On *Mr. David Roberts's* farm at *Bathafon*, also in the Vale of Clwyd, there are about 150 acres, one-third being pasture, evidently in good practical hands. There was a large extent of admirable wheat crop in July, and a corresponding area of clean and well-tilled fallow land, on which, however, the fly had destroyed two successive sowings of turnips.

At *Tan-y-Dderwen*, near Abergele, *Mr. Alexander Borthwick* occupies 122 acres of land, one-third of it arable. We saw here a capital flock of about 100 half-bred Cheviot ewes with their lambs, on some admirable two-year-old seeds. About 200*l*. is spent annually on bought food and manure. Ten cattle are fattened every year. Some 400*l*. are received annually for fat mutton, lamb, and wool, and there is a considerable extent of profitable potato ground.

CLASS VI.—STOCK AND DAIRY FARMS UNDER 100 ACRES EACH.

In the sixth class of small dairy or stock farms, the prize was awarded to *Mr. W. Edwards*, of the Brewery at Ruthin, for his very fertile and productive little farm at *Pen Rhos*. There are here 35 acres arable and 17 acres permanent pasture. Four cows are kept either on the farm or at the brewery on the farm-produce, and there is a flock of 40 really admirable Shropshire ewes with their lambs. The wheat and barley were looking too heavy to stand when we visited the farm in July. The green-crop quarter was very good indeed: potatoes, mangolds, swedes, cabbages, were all promising well. The clover crop had been heavy, and there was a strong second growth coming on. About 60*l.* a year is paid annually for manure, and nearly 100*l.* for purchased food, including grains, malt-dust, &c. Ten or 15 cattle are generally fed each year; 21 had last year realised 412*l.*, and 4 in-calf heifers had been sold. Some 200*l.* had been realised by the sale of fat sheep, lambs, and wool. The land was clean, provided with fair premises and good roads and fences; the crops were good, and there was a large quantity of excellent stock upon it. The award was inevitable! The fact may be put in that way because, although, when compared with the other farms in the class, the Pen Rhos farm was much the most productive, yet it was not without reluctance that the prize was given to one whose business as a brewer close by necessarily gives him an immense advantage in the competition—an advantage outside of the mere farming occupation which we were instructed to judge. It is not, indeed, improper to state here that on our first round among these farms in December last, it appeared to us that *Mr. John Gregory*, of *Waverton*, near Chester, must take the prize in this class. He has 61 acres in his occupation, of which 13 are permanent pasture, 29 in grass of various ages, and 19 under the plough. On these, 18 useful cross-bred cows are kept, 3 calves, yearlings, and two-year-old heifers are reared, and as many of the older cows are drafted off as stores. About 63 to 65 cwts. of cheese of fair quality are sold each year. Eight hogs of a large coarse white breed are fattened, and 20 porkers fed. The premises are substantially built, very well arranged, and in every respect satisfactory; the farm-house and garden are as neat as can be, and nothing can exceed the cleanliness and beauty of all the dairy arrangements. Three very good horses are worked on the farm; but they are also employed in hauling for the estate, and in mowing and drilling for neighbours; and a considerable sum is annually earned in this way. Mr. Gregory and his two sons and a hired labourer do all the work, both within and outside of the farm, and better management there can hardly be. On our summer visit, however, we found some of the crops for the year were very unpromising. There was, indeed, a very heavy crop of seeds just mown, but the corn crops had not been got in well, and the turnips had been destroyed by the fly, and the farm, though clean, was not in show condition. It was impossible to give it the place we expected it to take, although it alone, of all the entries, seemed at the outset to answer what we believed to be the intention of the Prize.

There were two other entries in this class.

On *Mr. Wright's* farm at Minshull-Vernon, there is a large quantity of beef, mutton, and bacon made and sold, and some useful horse-breeding. The management, however, varies from year to year, according to market and to judgment. Sometimes pig-feeding is abandoned, and calf rearing, in-calf heifers being sold, is carried on. There is a heavy rent, a considerable labour bill, and about 150*l.* spent annually in manure and cattle-food. The receipts also include considerable sums from the sale of hay and potatoes.

At *Well House Farm*, Scotforth, near Lancaster, *Mr. John Cottam*, who also occupies two other farms, has barely 100 acres of good grass-land, only 3 acres being arable; on which he keeps 24 admirable Shorthorn cows for the supply of milk, and rears 6 or 8 heifer-calves, yearlings, and two-year-olds. A good bull is kept, and the young stock is very good. There is also a small flock of sheep, and 14 or 15 bullocks are grazed in summer, and a few Highland cattle are kept for winter grazing.

Believing that we have now stated enough to justify our awards in the several classes, it only remains for us to express our hearty thanks for the courtesy and hospitality which met us everywhere upon our successive rounds of inspection.

(Signed) E. LITTLE.
W. T. CARRINGTON.
J. CHALMERS MORTON.

XXVI.—*Report on the Liverpool Meeting.* By the Hon. WILBRAHAM EGERTON, M.P. (SENIOR STEWARD.)

I SHALL leave to the official Reporter the task of going fully into the different classes of stock, and shall confine myself to making a few general remarks on the Royal Agricultural Show at Liverpool.

It has been a decided success, even when compared with the last, which was in a more central position, and attracted such large numbers from the Midland Counties. This result has not been owing to any extraordinary object of attraction, or to any sensational leaping of hunters, so often adopted by local Shows as a means of replenishing their coffers. Even the visit of the

Emperor of Brazil, who, like the Caliph in the 'Arabian Nights,' prefers to pass unobserved, was strictly private. The receipts at the gates for the first four days were much larger than at Birmingham. The rainy weather on Monday alone had the effect of diminishing the attendance to a figure (31,935) far below that of the corresponding day at Birmingham (61,567), but the total money paid for entrance at Liverpool amounted to 14,470*l.* against 13,540*l.* at Birmingham.

While much of this success is owing to the natural attraction of the Show, due thanks must be given to the Local Committee and private donors, who raised a sum of about 2350*l.*, which was given away in prizes, and by their exertions did so much to meet the requirements of the Society. The energy of the Chairman of the Local Committee, Mr. Alderman Hubback, overcame all difficulties; and the Secretary, Mr. Rigby, was always ready to attend to any suggestions which his Committee could carry out. The Society must also acknowledge the liberality which enabled the thoroughfares of Newsham Park to be closed during the construction of the Showyard, and which provided an excellent ground in an airy and convenient situation close to the town.

The Police arrangements were, in my opinion, unusually good. The Corporation placed the Judges' lodgings at the disposal of the principal officers of the Society, which, by their proximity to the ground, facilitated the work of the Stewards in carrying out their supervision of the stock and implements.

The well-known hospitality of the town was evinced by the splendid entertainments of the Mayor and the Mersey Dock Board, and those who partook of it and visited the public buildings of the town, and the acres of docks which line both sides of the Mersey, will carry off a pleasant recollection of their visit to the town of Liverpool.

Few of the present Council were members at the previous Meeting of the Society at Liverpool in 1841; it is therefore worth while to refer back to it for the purpose of comparison, and to test the progress of the Society. The 'Agricultural Gazette,' whose spirited proprietors printed and published that paper daily in the Showyard, contains some instructive articles on the changes which have taken place in agriculture between 1841 and 1877. Into these it would be beyond my province to enter, but a few facts in connection with that Show are worthy of attention. The record of the Exhibition of 1841 occupied but a small space in the Society's 'Journal.' There were then but 125 cattle and 19 horses, as compared with 328 of the former and 320 of the latter now. It was the first time that implements had any special recognition, and they filled two rows of sheds; while this year there were several miles given up to them. The commercial prosperity of the town has largely increased in thirty-six years, and the tonnage of the shipping has been trebled, but the Society's Show has increased still more rapidly; it then occupied about 7 acres, while this year it covered more than 70 acres.

Much of the progress in agriculture in this period, both in stock and machinery, may be traced to the operations of the Royal Agricultural Society, and the local societies which have followed in its wake. It may be that they have partly accomplished the first stage of their work; namely, the general improvement of stock by judicious breeding, and that we cannot expect in the next generation to see a proportionate progress on these points, though there is still ample room for improvement in the stock of many farmers. But much remains for the Society to do in the investigation of the application of manures to the soil, and testing their effects by experiments in different localities, such as are now being conducted at Woburn by the liberality of the Duke of Bedford, and under the supervision of Mr. Lawes and Dr. Voelcker. The encouragement of a higher scientific education among farmers, the diffusion of knowledge respecting the diseases of animals, and the state of agriculture in foreign countries, also still leave a large field of usefulness open to the Society.

The exhibition of machinery, now so prominent a feature, as evinced by the large number of entries, and whose province it is to make up for the dearth of labour in the operations of agriculture, would hardly by itself attract the general public. Hence the shows of stock, which some are inclined to depreciate as superfluous in these days, are the means which the Society must continue to use in order to popularise its operations, to keep up the interest of the general public in so important a branch of national industry, and to publish its progress to the world. The classes of Shorthorns and horses carry off the palm in the estimation of the public. The former were admirably represented, as might be expected in Lancashire; and among the latter, the agricultural horses were a "*sight*" by themselves, stimulated as the competition has been by the magnificent prize of 100 guineas for the best cart-stallion in the Showyard, given by Major Walker, the Mayor of Liverpool, and a silver cup, valued at 50 guineas, given by Lieut.-Colonel Steble, ex-Mayor, for the best agricultural cart-mare or gelding.

How could the value of rearing powerful dray-horses for the service of our great commercial centres be better realised by breeders than by the exhibition of 333 horses belonging to thirty-three employers of labour? It is difficult to select any for commendation where all were good. The leading horses, whose place in the procession was assigned by lot, were a fair sample of the high quality of the rest. The men, with their white smock-frocks and aprons, were justly proud of them, and had decorated them with ribbons; their chains and trappings bore witness to the same care. The Corporation of Liverpool and the London and North-Western Railway Company vied with each other in the symmetry and size of their horses, and the perfect match of their black and grey teams, which won well-merited applause from the spectators who thronged the enclosures. The selling value of these horses could not be put at a lower value than 30,000*l.* Probably no other town of the same size could show such a selection of draught-horses.

I cannot forbear from alluding to the display of cheese and butter, which, owing to the vicinity of the dairy districts, was larger than usual. The Cheshire cheese was well represented, but it is a significant fact that the first prizes in that class were taken by a Shropshire exhibitor: this may be partly accounted for by the fact that so many farmers in the neighbourhood of Liverpool and Manchester have given up making cheese, and turned to the sale of milk and the feeding of stock; and that, owing to the difficulty of getting skilled labour, recourse has been had to factories, which, while they obtain a better average of quality throughout a district, have not yet turned out better cheese than that produced on the best managed farms by the skilful wife or daughter of the farmer.

It only remains for me, at the close of my duties as Steward, to thank the officials of the Society and my brother Stewards for the assistance they have afforded me on every occasion.

23, *Rutland Gate, July* 26*th*, 1877.

XXVII.—*Report on the Exhibition of Live Stock at Liverpool.*

By W. Macdonald, Editor of the 'North British Agriculturist.'

Among the many successful Country Meetings which the Royal Agricultural Society of England has held, the grand display in Newsham Park, Liverpool, on July 11th, and four succeeding lawful days, is destined to take a high place. In some of its features the exhibition was beyond precedent, and all that seemed wanting to make the Meeting, financially and otherwise, rival, if not indeed surpass, the best Show of the kind on record, was a continuance, over the two last days, of that cool agreeable weather which was happily experienced during the first three days. Up till Saturday the weather was favourable, and visitors flocked into the yard from all quarters. The turnstiles for the first three days showed a more gratifying attendance than was registered in the corresponding period at the Birmingham Show last year. But a disagreeable change was at hand. Rain fell rather heavily on Saturday, and doubtless kept many intending visitors in the house that afternoon. On Sunday and Monday, unfortunately, the rainfall increased, and the traffic on the latter day soon brought the yard into an uncomfortable state for man and beast. A large attendance on the concluding, or "cheap" day, was thus out of the question. So well, however, was the Show patronised in the earlier part of the Meeting that, notwithstanding the gloomy close, about 140,000 visitors entered the yard as compared with 163,148 at Birmingham in 1876. The admissions of last year were exceeded in the Society's history only by those at Manchester in 1869. In point of attendance, therefore, the Liverpool Meeting ranks amongst the highest; and as regards money drawings, it has to be noted that the results are nearer those of Birmingham than the total admissions indicate, because the falling off at Liverpool was on the "cheap days." Taken all in all, the "Royal" Show of this year must have been gratifying to the Society. It certainly was a credit to Great Britain, and a source of satisfaction to the inhabitants of the great commercial city in which it was held.

Of the splendid welcome which the city and district gave the Society, the Hon. Wilbraham Egerton, M.P., Senior Steward of Live Stock, has treated more appropriately than I can. The Local Committee left no stone unturned to make the exhibition a success. Their contributions to the premium list were on a scale of munificence hitherto unequalled. The great attractions which, through such liberality as this, the Society were enabled to hold out to owners of stock, had the effect of securing a good entry in a year when a comparatively poor display as to numbers would have surprised nobody. The unfortunate outbreak of cattle-plague in England last spring disturbed the arrangements both for the exhibition and sale of pedigree stock. Indeed, the Liverpool Meeting itself hung for some time in the balance. The dread of rinderpest in all likelihood prevented the appearance of many cattle in the yard that otherwise would have been sent. As it was, the entry of stock was a respectable one, and that of implements was very large. Horses numbered 369; cattle, 373; sheep, 411; pigs, 139—total, 1292. This is about 200 below the Birmingham entry, though very nearly 200 above the Taunton figures in 1875. At Birmingham cattle numbered 465, or 92 more than this year; horses in the Midland Counties numbered 424 as against 369; sheep were more numerous this year by 4; while pigs were 64 short.

Of the various kinds of stock represented, it has to be said that agricultural or cart-horses made a better display, perhaps, than they had previously done; that thoroughbreds, hunters, hacks, &c., were under average, at least in numbers, and certainly not over that standard in quality; that the Shorthorn Classes were well filled with good animals, though there was a want of "cracks"; that Herefords and Devons were few but fine; that Jersey and Sussex cattle were fair, Welsh cattle comparatively good, and the other breeds meagre; that the principal English breeds of sheep were quite up to average, and so were the pigs.

Before attempting a more minute description of the animals, a few remarks about the arrangements and the general appearance of the yard are called for. The available ground was somewhat irregular in shape, but ingenious heads, willing hands, and plenty of money, made it on the whole a convenient yard, comparatively easy of access from the bustling centre of the great commercial city which was honoured by, and duly appreciated, the Society's visit. Details of the arrangements of the yard are quite unnecessary here, read as the 'Journal' is principally by the members of the Society, who have had an opportunity of witnessing the admirable manner in which everything connected with the Show is accomplished. I have no hesitation in saying that the arrangements for the convenience and comfort both of exhibitors and visitors in the "Royal" Showyard are, in my opinion, about as near perfection as it is possible to make them. Well, the Liverpool Meeting in the details of arrangements lost nothing by comparison with any of its predecessors, and that is saying a great deal, for there can be no doubt that the "Royal" is the best conducted annual exhibition of the kind in the world. Visitors, both home and foreign, with whom I have conversed, are at one on this point. The Royal English Showyard is unquestionably *the* sight of the year for those of a bucolic turn of mind. I never met with a farmer or breeder who, having once seen a "Royal" Show, readily forgot, or ceased to tell his friends, what he witnessed and admired, and few, if any, have I encountered who would not make an effort to see such a display frequently, or, if possible, every year. Nothing could better illustrate the good the Society and its Shows do, and the hold they have on the agricultural mind, than the fact that many thousands of British farmers would not, in their own words often expressed to the writer, "like to miss the Royal." If they do miss it, they certainly miss a treat. It is in every sense of the term an educative meeting to agriculturists.

The seventy-five acres enclosed were fully occupied. It would have been preferable if the horses had been nearer the cattle and sheep, yet no material inconvenience was occasioned. It is curious to note that when the Society visited Liverpool before with its third Show in 1841, seven acres sufficed for the display. I would fain linger over a comparison of the state of British agriculture thirty-six years ago with the present, and very interesting would it be to glance at the rise and progress of agriculture in the course of these thirty-six years, but the title of this Report, any more than my commission, does not cover such a digression, and so I refrain. Returning to the bestial department, I commence, as the Catalogue does, with

HORSES.

Agricultural.—The classes of Agricultural horses other than Clydesdales or Suffolks were probably the best filled in the equine department. It was, however, very difficult to see much difference in type and character between many of the animals competing as Clydesdales and those confined to the "Shire" horse classes. This was not the fault of the agricultural horses, but of the Clydesdales. There was a perplexing variety of form and features in the Clydesdale ranks. It has often been asserted that there is a great deal of English blood in many of the best Clydesdales of the present day. That there is much English blood in many of the animals called Clydesdales, whether in the best ones or not, was never more manifest than at Liverpool. Many grand animals were exhibited, yet I do not consider that the representation of Clydesdales at Liverpool was so satisfactory as it might have been. Not that bone, build, and, in some instances, beauty were lacking, but there was too little similarity of type, and a positive want of true Clydesdale character about many of them. The agricultural Classes carried the palm for the symptoms of early maturity in the younger specimens. It is worthy of remark that, since last year, the breeders both of Clydesdale and Suffolk horses have resolved to form Societies for the purpose of superintending the publication of Stud Books, and otherwise endeavouring to improve the respective breeds. These are steps in the right direction. Some opposition was offered in Clydesdale circles, chiefly by those who infuse English blood extensively with, or who deal in, Clydesdales. The selfishness of the opponents, however, was easily perceived, and practically the opposition was never felt.

Five of the twenty-six agricultural stallions over three years old which formed Class 1 were absent, but little missed. The Judges had evidently enough to do with twenty-one such animals as were paraded before them. To select the first horse could not have taxed their skill. Lord Ellesmere's magnificent six-year-old bay horse, "Young Samson," bred by Mr. Richardson, Chatteris, Cambridgeshire, would be very hard to beat anywhere. A hypercritic, or a "Clydesdale man," might like a little more bone than this horse has. His furnishing, form, and fore-arm, however, are admirable; his action is good, back short, ribs well arched, couplings powerful, shoulder strong, breast grand, and head and neck very attractive. He was first at Bath in June last, and could not be denied the Mayor's 100 guinea cup as best stallion of any breed in the Royal yard. Mr. Wynn's second stallion, from Ryon Hill Farm, Warwickshire, has conquered in many a field, and gives a good account of the wear and tear of nine years. Among his honours he numbers two Royal firsts, —at Oxford in 1870, and Birmingham in 1876—while only lately he carried everything before him at Chelmsford. This horse is heavier than the first, has strong quarters, splendid neck, and great rib. On the loin, however, he is not so strong as "Young Samson." The ten-year-old chestnut horse "Young Champion," which has taken many honours for Mr. Statter, Stand Hall, made a capital third. He is a thick, handsome, well-bodied horse, perhaps a trifle heavy in the body for his legs. Mr. Nix's "Reserve" horse is a six-year-old compact bay of Mr. Sampson's breeding. The Messrs. Nicol's five-year-old stylish dapple-brown horse, "Topsman," of Mr. William Kerr's breeding, displayed good fore-arm, great muscle, and fair action. He merited his commended ticket. The Stand Stud Company, Mr. Crowther, and others, had really good useful horses in the Class, if the tickets at the disposal of the Judges could only have reached all the meritorious animals. The heaviest horse in the yard, to all appearance, was Mr. Marsters' six-year-old strawberry-roan, "England's Wonder," exhibited unsuccessfully in this Class. This sire has won many prizes, particularly in the South-Eastern counties of England.

For evidence of the good breeding properties both of "England's Wonder" and "Young Samson," it is only necessary to pass on to the next Class. There a son of the latter was first, and one of the former's get was second, in strong company. Lord Ellesmere's first-prize two-year-old chestnut colt, by "Young Samson," was bred by Mr. Richardson, Cambridgeshire, and promises to eclipse his sire in size and muscle, if not in symmetry and compactness. The two-year-old has an immense chest, good quarters, and fair feet. Mr. Street's second colt, bred by Mr. C. Beart, is also wonderfully developed for his age, and bids fair to rival his huge sire, already spoken of, in substance and Showyard achievements. Mr. Marsters was more fortunate in this class than in the aged one, having obtained third ticket with his handsome chestnut colt, "Topsman," of Mr. Saberton's breeding, which was first at the Essex Show this year, and seems to have a deal of Showyard mettle in him. He has a fine top and good rib. A little more bone would improve him; nevertheless he is a nice horse, and moves remarkably well. The fourth colt in order of merit is a well-grown chestnut, shown by Mr. John Rowell. The prize animals and a few more were above average. There were, however, some ordinary specimens in the Class.

Only ten of the fourteen yearling colts entered were sent. The Judges could not get past the big, shapely, astonishingly well-made-up chestnut colt, shown and bred by Mr. Beart, and a winner of several first prizes this year. He accordingly got and deserved the coveted ticket. Lord Ellesmere's second colt has good action and a nice body, if rather light bone. It was bred in Cambridgeshire by Mr. H. Edwards. The fourth one, from the same distinguished stud, has more of the Clydesdale features than most of his companions. Mr. Drew's third colt, being a late foal, was not so big as many of the others. His back, rib, and muscle are, however, promising, his style and action attractive, and his bone below the knee just a little too fine. The sire of this animal was the famous "Prince of Wales," the service fee of which, at Merryton, is 40*l.* per mare.

In order to dispose of one breed before beginning another I pass on to Class 13, where there was a small but very good display of agricultural mares with foal at foot. The Earl of Ellesmere's first mare is an eight-year-old bay, by "Honest Tom,"—a capital sire,—and bred by Mr. Flintham, with a nice foal after "Young Samson." She was a clear first, so far, at least, as body was concerned. Her make is good, top first-class, bone rather light, action excellent. Mr. T. H. Miller's "Princess of Wales," from Singleton, bred by Mr. E. Parkinson, is a well enough furnished animal, with a better fore-arm than the first mare had, but altogether well enough placed second. Lord Ellesmere's third is of a useful sort, and so are several others in the Class. Mares under 16 hands, with foal at foot, were a good class. Here, again, the Earl of Ellesmere was invincible with a very smart, tidy, brown four-year-old mare of Mrs. Millhouse's breeding. Her action could not fail to attract attention, nor could her great fore-arm, muscle, and fine flat bone. His Lordship's third mare is of a plainer sort. Mr. Drew's second mare was of heavier build than the first, being finely coupled, short on leg, deep in body, and good in bone. Bred in Lincolnshire, her foal is by "Prince of Wales."

The three-year-old filly Class was a grand one, as may be inferred from the fact that the Judges gave all the animals, with one exception, a ticket of some kind. The Earl of Ellesmere, however, was again equal to the occasion. The winner here was a stylish heavy bay, bred by Mr. W. Fullard, and sired, as the first-prize yearling colt was, by "Wiseman's Wonder." Before the close of the Show, she was accidentally "lamed" by a stab from a stable-fork in a hind-leg, which spoiled her appearance somewhat. The second one, a stylish chestnut shown by Mr. James Jackson, has a symmetrical frame and good action. Mr. Drew's third filly is a spirited black, bred in Derbyshire, with good top, and, like the second, light bone. While the first one, which was in the same position at Bath, had more bone and muscle than her opponents, the second and third were fully as well topped. The two-year-old filly Class was not so good as the one just described, yet it was creditable. Mr. Drew got to the front here with a black filly (breeder unknown), with good body, very fine flat bone, and nice action. Mr. Marsters's second is a heavy, useful-looking grey, sired by the ponderous old horse, "England's Wonder." The rest in the Class were fair specimens.

Only four pairs appeared in Class 26: pairs of mares or geldings over 16 hands. They were all "placed," and well deserved to be. The first pair, owned by Mr. W. Bramley, Doncaster, were powerful well matched animals, in very high condition. If Mr. Drew's chestnut mare, in the second pair, had not been heavily weighted by her neighbour, the award might have been otherwise. The chestnut is a six-year-old English-bred mare, very strong in her couplings, showing great substance, firm build, fine feet, and fair action. She afterwards gained the ex-Mayor's 50 guinea cup as best mare or gelding in the yard. Mr. C. W. Brierley's third pair displayed great size and powerful make. Pairs under 16 hands were not so good. Mr. C. W. Wilson's first pair of mares, from High Park, Kendal, were exceedingly well-matched, tidy, well equipped animals, a considerable way ahead of their antagonists. The Stand Stud Company's second pair were nice little mares —animals that would work with heavier beasts. The third pair, belonging to the Mayor, Aldermen, and Burgesses of Liverpool, were moderate specimens, one of them being what is known in some parts of the country as "rat-tailed." In a large and good class of mares or geldings over five years, Mr. Charles Beart was easy first, with an immense specimen of equine development, wide in her frame, shapely, and supported, as such a body would require to be, by good legs and durable feet. She was hard in the race for the cup. Lord Ellesmere's second mare moves stylishly, and is well topped. Her tail is not nice. About his Lordship's third mare, Mr. Crowther's fourth, or Mr. W. A. Meadows' fifth, there is nothing very remarkable, except a "rat-tail" attached to the last-named and otherwise good animal. Ticketless, in this class, was the best trotting cart-mare I have ever seen. I allude to the well-known twelve-year-old grey mare "Sensation," owned by Mr. C. W. Brierley, Prestwich, and bred by Mr. Tennant, Barlow, Yorkshire. She has won many prizes, and would run a Norfolk cob hard in a trotting-match. In the large ring she was trotted out daily, and her extraordinary action drew forth loud applause from the crowd. It was one of the "sights" of the yard. A small though good Class was that of four-year-old mares or geldings over 16 hands. Mr. Drew's well-balanced brown, bred in Derbyshire, was a distinct first. She is well ribbed-up, stylish in gait, and firm in build; while her legs and feet speak well for her durability, and her bone is clean and flat. The Earl of Ellesmere's second gelding has great muscle. The Class of the same age under 16 hands was a failure, as was also that of three-year-old geldings. Two-year-old geldings were fairly represented. Mr. Henry Smith's first has plenty of body but rather light bone. The second one, belonging to Mr. T. H. Miller, looks like growing into a useful horse. The Report of the Judges of the above classes is as follows:—

CLASS 1.—No. 14 is a grand horse with splendid action, and we consider him well worthy of the high honours awarded him. No. 9 is a grand heavy horse. No. 21 is a thick compact horse. No. 25 is a very useful horse. The whole class is a large and good one.

CLASS 2.—No. 41 is a very promising colt indeed. No. 43 is also a very promising colt. No. 47 is a nice colt. No. 30 is a useful colt. The above are a lot of grand colts.

CLASS 3.—No. 55 is a good heavy colt. No. 56 is a colt of nice quality. No. 66 is a useful colt but little, being a late foal.

CLASS 13.—An extraordinary good class.

CLASS 16.—A very good class.

CLASS 17.—With the exception of one entry, this is an extraordinarily grand class.

CLASS 20.—A very useful class.

CLASS 26.—A class of powerful animals.

CLASS 27.—No. 244, a pair of nice mares, remainder of class moderate.

CLASS 28.—No. 254, a grand wide mare, with fine action. No. 258, a stylish finely-topped mare. The remainder of class very good.

CLASS 29.—A very good class.

CLASS 30.—Only one entry, and no merit.

CLASS 31.—Only one shown, and no merit.

CLASS 32.—No. 273, a fine topped colt, but short of bone. No. 274, a colt of nice quality.

We consider the horses shown in the above classes to be very good indeed.

(Signed) BENJAMIN SPRAGGON.
WM. THOS. LAMB.
ARTHUR TOMLINSON.

Clydesdales.—The aged class of stallions was worthily headed by Mr. Crowther's famous "Topsman," an 8-year-old chestnut, bred by Mr. Wilson, Whiteside, Aberdeenshire, and the winner of the highest honours in Scotland, when the property of Mr. Galbraith, Croy Cunningham. This horse has not much of the genuine old Clydesdale stamp about him. He is, however, so well put together, has so great muscle, good bone, and excellent action, that Judges have difficulty in getting past him; while he is wearing well, being still active, big, and blooming. The second horse, owned, as many good animals have been and are, by Mr. D. Riddell, has a deal of Clydesdale character, fair action, and good form; still he had no chance with such a powerful, durable horse as "Topsman." "Paisley" has a good flat bone and excellent hocks. He has since been sold at 600 guineas to go to Australia. "Gleniffer," a well-bred black, owned by Mr. Gemmell, deserved his third honours. He has been a winner in West of Scotland Shows, and was selected last season for the Earl of Tankerville's Northumberland tenantry. If anything, he is under-sized, does not stand very wide on his fore-legs, nor is he very strong in the quarters. A grand neck, however, he has, and his hocks and bone are good and likely to wear well. The two-year-old Colt class was better filled. Mr. Thompson's first one had a manifest victory. He is a big well-grown bay, bred by Mr. Jas. Cunningham, Tarbreoch, and first winner at every Scotch Show of any note this year. Mr. Thompson got a capital bargain of this colt last spring, at something under 300 guineas. His selling price is now 1000 guineas. I did not fancy him a little above the hocks, but otherwise he is a grand animal—one of the biggest and best two-year-old Clydesdales that have been shown for some years. Mr. Andrew's black colt was not a very popular second. His sire was a well-known, high-standing, stylish horse, "Defiance." The third colt, owned and bred by Lord Polworth, is a big strong bay, with great muscle if little Clydesdale character—just a good substantial cart-horse. Mr. Riddell's fourth colt, bred in Dumfriesshire, is fully as promising as either the second or third. He stood next the "Baillieknowe Colt" at Glasgow, and to all appearance has the makings of a good horse in him. Mr. Baird's fifth, or highly commended colt, was a dashing bay, with grand legs, fine feather, and true Clydesdale character. He was bred at Knockdon, Ayrshire, and at the sale there last year cost 520 guineas, which is the highest price by 20 guineas that has yet been paid for a yearling of the breed. Unluckily, however, the animal died from inflammation of the lungs a fortnight after the Show. Several promising colts were commended, including a well-topped, if rather light fore-armed, bay of Mr. Richard Tweedie's, a well coupled son of "Topsman's," owned by Mr. Crowther, and a stylish son of the wonderful old horse "Young Lofty," a grand bay which, by the way, was shown unsuccessfully in Class 4. The old horse looks well, although now 16 years old, and has won many leading prizes, including first at Bedford

Royal in 1874. Her Majesty the Queen's dark brown son of "Prince of Wales," which cost 400 guineas at the sale of the breeder, Mr. Drew, lately, has plenty of style and action if he had only more bone and hair below the knee. Yearling colts were a poor class. The Queen's first one cost 200 guineas at Mr. Drew's sale last April, and would be improved by more bone and feather.

Mares with foals at foot were a small but very select class—as the Judges remark, every one of the three deserved and got a prize. The first, four years old, from Baillieknowe, bred near Castle Douglas, is a nice bay, which, as a filly, carried everything before her in Scotland last year, with one exception, when she was beaten by a 590 guinea filly, now at Keir, Perthshire. She has good limbs and fair build, not very strong waist, and short good back. Her foal has shaken her somewhat. Mr. Drew's second is a very highly bred mare of Knockdon blood. She had more substance than any of her opponents, and had the best body, only her pasterns are not so good as those of the first mare. The second one cost 400 guineas at the Knockdon sale last October. The third mare, belonging to Lord Ellesmere, has frequently been among the winners. In moderate condition, she is a good type of a Clydesdale, and was bred in Kircudbrightshire, where many grand animals have been reared. A pretty good class of 3-year-old fillies was clearly topped by Mr. McQueen's nicely balanced bay, from The Crofts, Dalbeattie, bred in Argyllshire. She was second in a great contest at Glasgow in May, has a good fore-arm, fair bone, and strong build. The Duchess of Hamilton's second filly is a very nice dark brown of Mr. Drew's breeding. She is a tidy active animal, somewhat small in size. Mr. Drewitt's third prize is not like a Clydesdale. She is light in bone, and not well balanced in frame. Her action, however, is pleasing. Mr. Bruce's fourth filly is not so well-hearted as could be wished, though many "Clydesdale men" would have preferred her to the third.

At least, the prize animals in the two-year-old filly class were good. Mr. Tweedie's first, bred by himself, has had a very successful showyard career. She is a well-topped evenly grown bay, of good action, and is grand in the quarters as well as at the flank. More bone above the knee would help her greatly, yet she was a sure first. The second filly, belonging to Mr. Drew, is a big outcoming animal, bred by Mr. Knox, and sired, as many prize animals have been, by the well-known horse "Lord Lyon." When running she lifts her feet well, and has great muscle and good feather. Her ribs are not so well sprung as those of the first filly. The Havering Park filly, placed third, is a thick thoroughly useful sort.

Suffolks.—The Suffolk classes were not all very well filled. The animals exhibited, however, did credit to this very active durable old breed. If the Suffolk horses are not the purest of all the varieties of cart-horses, they are, at least, the most uniformly marked and made. Their bodies look heavy for their legs; nevertheless they work capitally and wear well. In the stallion class, Mr. Richard Garrett's magnificent three-year-old admirably developed chestnut, bred by Mr. Frost, early asserted his claims to the first ticket. His build and bloom could not be got over, notwithstanding the grand barrel, fine muscle, and rare action of Mr. Horace Wolton's six-year-old of his own breeding. Mr. Biddell's third is also a three-year-old, not so well furnished as the first, but an active useful horse. The commended horses, owned by Mr. Garrett, showed well-knit frames. Mr. Wolton's first two-year-old colt was ahead of his neighbours. His back, buttock, and ribs are wonderfully good, and his general appearance attracts the eye of a fancier. Mr. Toller's chestnut, bred by Mr. Wainwright, was not grudged second honours. The turn-out of mares and foals was not large. Mr. Wolton's first mare is a nine-year-old symmetrical animal, massive and full of action, true in make and a good breeder. Her foal is unusually promising. Mr. Biddell ran pretty close with his seven-year-old, thick substantial mare of his own breeding, with a stylish foal at foot. The others in the class were fair specimens. Three-year-old fillies formed an inferior display. Mr. Toller's first one is a strong, well-grown beast. Merit did not warrant a second prize. Mr. Capon was alone in the two-year-old filly class, though his animals, of his own breeding, would have stood competition well.

The Judges of Clydesdales and Suffolks report thus:—

> The classes of Clydesdales were not so well represented at the Royal Agricultural Society's Exhibition as we think they ought to have been. Englishmen are taught to believe no draught-horses are worth so much money as the Clydesdales, and certainly, from all reports, none have made such high prices.
>
> Class 4 was only fairly filled as to quality. No. 68 was easily placed first; a very fine upstanding horse, well made; and we afterwards heard he had taken many prizes. No. 75 was second. His action was not too good for a horse of his breed. No. 69, third, had hardly the appearance of a Clydesdale. No further comment can be made, as we could not find one good enough for Reserve Number.
>
> CLASS 5.—A strong lot of fifteen. No. 86, a big growing colt, of very fair quality, back not quite straight enough, particularly behind the shoulder. No. 90, second prize, a big useful colt, though, like another black in Class 4, not showing all the appearance of his breed. No. 81, another good colt, looking more like a Clyde. No. 91, a very well-made young one, capital back and body, but has not the appearance of growing so much as some of his companions. No. 79, very nicely turned about his back and body, limbs and feet not quite big enough. No. 84, too little hair about his legs for a North country horse. No. 85, highly commended; a very nice colt, but not enough of him for a

cart stallion. No. 87, a big colt, with a splint on one leg, which the veterinary surgeon took no notice of.

Class 6.—Very badly represented; only one worthy of a prize, which we learned afterwards belonged to Her Majesty. We should like to have seen something better from the Royal farms.

The Suffolk horses were few in number, but showed uncommonly well—certainly, in our opinion, in the best form of any cart-horses at the Liverpool Show.

Class 7.—Nine exhibited out of an entry of fourteen—with one exception, from their own county. No. 102, an extraordinarily well-grown three-year-old horse, most weight on the shortest legs, perhaps, of any horse in the Showyard. No. 109, a good type of a Suffolk horse, six years old, wearing well with hard work. No. 96, another three-year-old, good upstanding colt, might be a little bigger at his girth. No. 99, a useful four-year-old, very clean and active. No. 104, big and good looking.

Class 8.—No. 112, first prize, a very smart colt. No. 111, a good second. We thought both this and the first-prize horse in this class a little deficient in bone below the knee. No. 110 was very much the biggest in the class; but was not passed by the veterinary surgeon.

Class 14.—Only three in the class, all deserving prizes. No. 162, four years old, a very active good mare, indifferent foal. No. 164, much more size, good mare, young inferior foal. No. 163 we thought the best of the three, a very big good foal, but crippled, which obliged us to put her below the others in the prize list.

Class 15.—No. 168, a very level mare with good outline, capital action, rather high on the leg. No. 166, a thick clever mare, with an appearance of side bone, though not enough to prevent her being passed by the veterinary surgeon. No. 169, a good third. No. 165, very useful mare and foal.

Class 18.—No. 193, good type of Clydesdale filly, round ribs, capital feet and legs, good mover. No. 192, very much the same sort as the last; deficient in size. No. 190, very big good filly, having not so much character as the last two; goes well. No. 187, a plainish mare with plenty of size. No. 191, black, with flattish sides and not so much bone.

Class 19.—Badly represented. No. 195, good enough for first prize. Second prize not awarded.

Class 21.—Three very good animals in this class. No. 211, a smart good filly. No. 213, big, low in condition, with famous arms and thighs, likely to grow to a good mare. No. 214, pretty filly, ribs none too long. No. 212, very useful.

Class 22.—But one shown, and it well deserved a prize.

Champion Prize for best stallion in the Showyard was awarded, after some discussion, to No. 14, which we learned afterwards belonged to the Earl of Ellesmere.

The Champion Prize for best mare or gelding, after some considerable judging, went to No. 243, a very good six-year-old chestnut mare, with some famous feet, and went well. No. 254 ran her very close for the cup; some of us thought she should have had it. This mare is a year younger than No. 243, much bigger, and goes as well; her feet may not be quite so good, though she is not much behind in that respect. We were told afterwards she had never been beaten before.

Wm. Thompson,
Alex. Turnbull,
Robert Findlay.

Thoroughbred and Riding Horses.—By all competent judges it was admitted that the display of these varieties was inferior to that of cart-horses, or, indeed, to the representations in these classes at several previous Shows. Readers of the 'Journal' do not at this time of day need to have the good qualities of those famous old sires, "Citadel" and "Laughing Stock," specially pointed out. Both animals have long been prominently before the public; both are eighteen years old, are by the same noted sire, "Stockwell," and are wearing well. "Laughing Stock's" rare bone and good quality were noticeable; but the accumulation of years is telling more on him than on "Citadel," who got first honours. Col. Barlow's six-year-old chestnut horse, "The Gunner," a grandson of "Stockwell," was indebted to bloom of youth, to a good back and middle, fine neck, and sound good limbs, for second honours in such aristocratic company.

In the class of stallions for getting hackneys, the Stand Stud Company's five-year-old chestnut, "Star of the East," is a strong, well-made-up, active horse—a grand stepper in the ring. The third one, "Little Wonder," from the same stables, has rather more quality and breeding, though much less substance and not such good shoulders. "Sir George Wombwell," a very beautiful Yorkshire horse belonging to Mr. Roundell, was a favourite with the lookers-on, showing fine make, excellent bone, and very fine action. The class altogether was a pretty good one.

Some of the pony stallions were greatly admired. Mr. Christopher Wilson's well-known "Sir George" is a great beauty, being symmetrical, firmly built, and very clever. His build is perfection itself, and his action brought down the applause of the Grand Stand. The trotting of this princely little horse was one of the attractions of the yard. Col. Barlow's second pony is a big three-year-old, with great muscle, immense stepping powers, though less inviting colour. Mr. Marshall's third one is a promising, neat, if not big, two-year-old dark brown, of wonderful quality—a little after the type of "Sir George," but, of course, a good way behind that invincible pony. In the class under 13 hands 2 inches, Mr. Wilson was again easily first with a charming little three-year-old son of "Sir George." It is a beautiful goer, and altogether a very smart pony. Mr. T. E. Blundell's second one is a sweet little gem, not quite equal to the first in action, but otherwise little, if any, behind it. At least the prize pony stallions were quite up to the average.

As in the thoroughbred stallion class, so in the hunter-breeding mares, a pair of eighteen-year-olds were put first and third, with one less than half the age in the middle. Mr. G. F. Statter's "Lady Lyne" is wonderfully up for her age, displaying good hard bone, well-trained muscle, and durable lengthy frame. She has gained 12 prizes, and was a decided first at Liverpool. The second mare, belonging to Mr. Bee, being only eight years old, was in good Show form, and is a strong active mare, likely to breed well. The third, owned by Mr. Brocklebank, is sinking, as might be expected, at eighteen. Her chance was deservedly heightened by the presence of a good foal at foot. A mare more likely to breed a good hackney than Mr. Kirby's "Nelly" one does not often see. She is at once a beautiful hack, very symmetrical, and firm in barrel, with clean fine legs and wonderful action. Then her foal promises even to surpass its dam in merit. The second mare, "Miss Polly," is a well-knit useful-looking animal. Mr. Bailey's third steps easily and shows a "chip" of breeding. Pony mares and foals were a fair class. Mr. Gill's first prize is the tidy eight-year-old chestnut which headed the list at Birmingham last year. She is very smart, and has a nice foal. Particularly strong on the back, and stylish about the head and neck, is Mr. Gledhill's second pony. The third one, from Aylesby, was a favourite of its worthy owner, the late Mr. William Torr, and is wonderfully hale and active at the ripe age of 23. She is lean, and has a very fine foal at foot.

For the Royal Show, and especially the district of meeting, the supply of hunters, as a whole, was rather disappointing. The cause of this I cannot attempt to explain. One thing that should not be lost sight of is that hunters are expensive, and very risky stock to breed and rear. They are not early enough marketable, and there are apt to be too many misfits for rentpaying farmers to rear them. There can be no question that there is often a sacrifice and always a risk in the rearing of such stock. Breeders of this very useful and highly prized class of animal thus deserve every possible encouragement. The chief point of interest in the heavy-weight hunter class was the result of a renewed tussle between the Duke of Hamilton's "Winder" and Mr. John B. Booth's "Baldersby." They had a hard pull at the Alexandra Park shortly before, which ended favourably for the Yorkshire horse. Between these two there is little to choose. His Grace's black is a powerful horse, and a graceful runner. There are not wanting, however, good Judges of field horses who would back "Baldersby" to give "Winder" a heat, crossing a deal of country in a long day. The judges at Liverpool eventually reversed the London decision. Mr. Hutchinson's five-year-old chestnut horse, "Glengyle," of Mr. Swanwick's breeding, and already well-known to fame, had a clear victory in the light-weight class. He, as most of the readers of the 'Journal' must already be aware, is a nice horse all over, being particularly good in the quarters and back, while he gallops with much ease and grace. When only three years old he cost nearly 400 guineas. "Vandyke" trots very well, and made a creditable second. Mr. Newton's well-grown stylish horse, "Sir George," was invincible in a moderate class of four-year-old hunters. Three-year-old hunters formed a good class, yet the Duke of Hamilton's very promising finely furnished bay gelding "Boynton" was obviously ahead of his opponents, notwithstanding the good action shown by Mr. Rickerby's daughter of "Laughing Stock."

The hackney mares or geldings, as well as the pony classes, included a few animals of great merit, such as the Stand Stud Company's very pretty five-year-old hack "Silvertail;" their eight-year-old bay-mare "Surprise;" Mr. Robinson's "Charles the Second" and the Duke of Hamilton's plump princely little pony "Bosco," which is quite a Showyard hero. On these, as also on the thoroughbreds and roadster horses generally, my remarks have been abbreviated, on account of the very full and well-written Report which the Judges of this section furnished, and which is here appended:—

CLASS 9—*Thoroughbred Stallions*—at first sight, looked as if making a great show, but after the plums had been picked, little was left to fill the eye for hunting purposes. There being nothing good enough to beat old "Citadel," he made an easy win, and, in spite of his years, was looking blooming and well, though his hind action, never of the best, showed that time had been doing its work. No. 119, "The Gunner," by "Crator" out of "Double Shot" by "Stockwell," looking all over a light-weight hunter, with excellent legs, shoulders well laid, and nice easy action, got the second place. Not having been long at the stud, his middle looks light, which gives him the appearance of being undersized for a hunter sire, yet his good quality and paces are sure to turn to good account in country service. No. 118, "Laughing Stock," who did not seem to carry his years so well as his old antagonist "Citadel," dropped into the third place. No. 123, "Claudius," a gaudy son of "Caractacus," with good back and loins and indifferent shoulders, was highly commended and Reserve. Amongst the beaten lot, No. 124, "Bête Noire," is a nice compact little horse, but more suited for getting hacks than hunters. No. 126, by "Kettledrum," is by no means a bad sort.

CLASS 10. *Stallion for Hackneys.*—No. 133, "Star of the East," a flashy looking chestnut, a fine mover, and descended from a long line of trotting blood, placed himself first; with No. 131, "Sir George Wombwell," and No. 138, "Little Wonder," in close attendance. No. 136, "Norfolk Hero," being highly commended and Reserve. These four horses were a good lot, with plenty of bone and action, and quite up to the average of previous Shows.

CLASS 11—*Pony Stallions*—or, as they should be more properly termed, "Galloway Stallions," was headed by the old prize-taker, No. 144, "Sir George," the best animal of his sort that ever graced a show-ring. No. 143, "Gold Stars," descended from no end of other "Stars," a thick-set, three-year-old from Suffolk, with good action and plenty of power, was second; and No. 140, "Prince Charming," a two-year-old, showing great promise, with nice level action and quite the type of the old Yorkshire blood, third. No. 145, "Le Beau," highly commended and Reserve.

CLASS 12. *Pony Stallion.*—No. 151, "George 2nd," a son of "Sir George," but some way behind his sire, was first. No. 148, "Black Prince," more of a pony than the other, but not so good a goer, got second honours; and No. 150, "Cymro Bach," a very neat one from the land of ponies, got third. No. 149, "Fireworks," a compact little gentleman, but lacking the flash of his namesake, was highly commended and Reserve.

CLASS 23. *Hunting Brood Mares.*—A very moderate lot, of which No. 220, "Lady Lyne," was decidedly the best, and, thanks to her sire "Codrington," showed more quality than one would expect in a half-bred one; the daylight between her legs was barely qualified by her length, of which she was not deficient; and that she can breed well was fully exemplified in Class 35, where her produce by "Laughing Stock" got the second prize. "Lady Lyne," formerly known as "Rosamond," was ridden by the late Sir Charles Slingsby on the day that he met with his death, in the ferry-boat accident, whilst crossing the river with his hounds. No. 218, "Tidy," a compact mare, with good legs and shoulders, and well made up for the occasion, was placed second. No. 219, "Sweetheart," a long, roomy, useful animal, third; and No. 223, "Gipsy," highly commended and Reserve.

CLASS 24. *Hackney Brood Mares.*—A very nice level animal was the winner, No. 228, "Nelly," with a marvellous foal by "Prime Minister." It is said there is nothing like mother's milk, but to judge from the condition of the mother, this youngster must have been dipping his nose into something that suited him better. No. 230, "Miss Polly," on good short legs, was quite the right sort for a roadster. No. 231, "Sybil," a well-bred galloping hack, was third, with No. 225 highly commended and Reserve.

CLASS 25. *Pony Brood Mares.*—A small entry, but, on the whole, a good lot. No. 235, "Pet," got the red ribbon, and No. 237, "Lady Downs," the blue. No. 233, "Lady Godiva," a rare old sort, twenty-three years old, was third; and No. 236, "Mona," highly commended and Reserve.

CLASS 33. *Hunter, up to* 15 *stone.*—With the exception of the two winners, a very short and bad entry. No. 281, "Winder," and No. 280, "Baldersby," are both old prize-takers and good weight-carrying hunters. Of the two we thought the black the smarter and better goer in his gallop, and more like carrying a heavy man through dirt than the good-looking son of "Ainderby," so we reversed the Alexandra Park decision, and gave him the first prize.

CLASS 34. *Hunter, up to* 12 *stone.*—Another very moderate class. The winner, No. 289, "Glengyle," is in many respects a beautiful horse, and gallops in great form. His lengthy quarters, rare back and loins, and fine quality, make him a very taking animal; but he is not altogether right about his shoulders, and his head and neck are not set on as a hunter's ought to be. No. 285, "Vandyke," has not improved on his four-year-old form as much as might be expected; his slow paces are good, but he does not get away in his gallop like his rival. No. 287, "Sall," a bloodlike mare, placed third, moved very oily and well in her trot; her high clambering action in her gallop spoilt her. No. 292, "Polly," the Reserve, is a good sort.

CLASS 35. *Hunter, Four Years old.*—No. 300, "Sir George," won hands down, there being very little in the race against him. Though not without faults, he is a powerful weight carrier, and for a big one moves lightly and well. The spokeshave, however, might improve the points of his shoulders, and his quarters are somewhat plain, yet, taking him altogether, it will take very good company to beat him. No. 297, "Rosalind," daughter of "Lady Lyne," is a well-turned mare, with strong back and loins and good wearing legs, which she knows how to use. No. 295, "Bellona," shows good hunting form, and looks like finding her way to the finish in any country. No. 293, "Captain," a useful young horse, with moderate hocks, was Reserve.

CLASS 36—*Hunter, Three Years old*—the best of the hunter classes, was headed by "Boynton," a fine dashing colt by "The Baron." When time diminishes the daylight between his legs, he will make a good hunter up to weight. No. 311, "Kate," by "Laughing Stock," with plenty of action, was second. No. 304, a bloodlike "Carbineer," third; and No. 307, "Rural Dean," brought up the Reserve.

Class 37. *Hackney, up to not less than* 12 *stone.*—No. 324, "Silvertail," an old-fashioned sort, fit to carry an old gentleman in the Row, was our first pick. No. 317, "Major," a compact four-year-old by "Laughing Stock," with quite a different class of action, but no less useful, trotted himself into the second place, closely followed by Nos. 321 and 325.

Class 38. *Hackney, up to* 15 *stone.*—No. 328, "Surprise," well known in the harness ring, a fine stepper, though rather stale for her age, made an easy win against No. 327, "The Colonel," a plain but useful animal.

Class 39. *Hackney, up to* 12 *stone.*—No. 335, "Charles the Second," a good 14-stone hack, with showy action, was first. No. 331, "Kathleen," quite a good one, and nice level mover, when properly handled, got second; and No. 332, "Lady Sybella," infamously ridden, was coaxed into the third place at last, by change of hands. No. 337, "Princess," a four-year-old, rather high on the leg, was Reserve.

Class 40. *Hackney, not exceeding* 15 *hands, up to* 15 *stone.*—No. 342, "King of the Fairies," had it all his own way, and made almost a walk over.

Class 41—*Pony above* 13 *hands*—a very good lot, in which No. 347, "Bosco," easily carried the ribbons, and no wonder, for he is as neat as a Christian and has the manners of one. No. 345, "Liverpool," a snug little four-year-old and good mover, was second; with Nos. 343 and 352 close on his heels.

Class 42.—*Pony.* No. 365, "Rex," and No. 360, "Welsh Girl," two very peculiar-coloured duns, were first and second. It looks as if they had some foreign blood in their veins, Norwegian perhaps; whatever it may be, the cross had done a good turn for "Rex," giving him a back like a lion and plenty of quality and action; the mare was plainer, but looks like doing a hard day's work, and plenty of them. No. 369, "Gipsy," was a nice goer, but light in her middle, and did not show so much of the pony type as the other two. The Reserve and highly commended went to No. 357, a thick-set little gentleman, more for harness than the saddle.

We would suggest that if the Society, when they came into a large breeding district, gave better prizes for the old hunter classes, they would get a creditable show.

H. A. T. Luttrell.
Edward Aldridge.
Wm. Parker.

Cattle.

Shorthorns.—In an English Showyard no breed of cattle can rival the Shorthorn. The well-merited popularity of that invaluable breed was indicated by the large entry, and still more significantly by the very large attendance around the Shorthorn ring, during the unusually protracted process of judging. While the various other breeds represented were watched in their progress through the judging rings by a few ardent admirers and warm advocates of them respectively, the crowd at the Shorthorn ring testified anew to the national character of the "red, white, and roan." For "crack" specimens, however, the Shorthorn had for once to yield to both Herefords and Devons, though the latter were short in numbers. Four of the nineteen aged Shorthorn bulls entered were kept at home; but the fifteen gave the Judges quite enough trouble. Possibly those withheld from the yard would not have added to the Judges' duties. Anyhow, this was a very grand class, including many animals not unknown to the Show-going public. The best part of two hours were spent by Messrs. Aylmer, Sanday, and Beauford on this class. Of course that time, or much of it, was not necessary to select either the first or the second bull. Breeders and admirers who watch Showyard ups and downs expected that Mr. A. H. Browne's "Pioneer," if he had gone on well since last year, would give Mr. Linton's "Sir Arthur Ingram" and the Marquis of Exeter's "Telemachus 6th" a heat for the premiership of the year. The white bull from Northumberland, however, had not kept his form, and he was rather unwell on the judging-day. The field was thus clear for "Sir Arthur" and his victor of 1876, and it was about equally obvious that the Birmingham order of these two would have to be reversed, "Sir Arthur" having thickened and improved considerably since the Burghley Bull beat him at Birmingham in July, 1876. "Sir Arthur Ingram" was accordingly, with common assent, placed comparatively early into the comfortable corner, and there patiently waited for his first ticket. Sired by Mr. J. B. Booth's "Sergeant-Major" (29,957), this bull has a few good Booth crosses on a mixed foundation. At Hull, in 1873, he topped the yearling class, a position which he repeated in the two-year-old class at Bedford the following year. At that Show he looked exceedingly blooming. In each of the next two years he stood second at the "Royal"—in 1875 to "Duke of Aosta," and in 1876, to "Telemachus 6th." At Liverpool he looked better than he has done in public since the Bedford Show in 1874, and so turned the tables on his conqueror of the previous year. His quarters are long, deep, and massive; loin good, and general outline attractive. He has a very deep good brisket, and walks out with great gaiety. Though apparently highly fed, he lacks wealth of flesh somewhat. His shoulders might lie in better, and more width between his fore-legs when he stands would raise him in a Judge's estimation. "Telemachus 6th," a typical son of his father, has, like the old and very distinguished sire of that name, got uneven in the fore-legs, while his hind-quarters are not "pointy" enough. Rather short or round in the quarters, this bull has a fascinating head and neck, rare quality of flesh, very wealthy middle, and good hair. It was when a third came to be looked for that the trying work began. Four or five animals were almost neck-and-neck in the contest for the third ticket. Nobody can complain of what the Judges did. They performed their arduous duties—rendered all the more difficult on account of the absence of "tops," already alluded to—with great care, close attention, and evident knowledge of what they were doing. Difference of taste, of course, will always lead to a different arrangement of the animals, and though this inevitable diversity of taste and opinion was in full play among the on-lookers at Liverpool, it must be acknowledged that the Shorthorns were well judged. More pains to avoid mistakes never was taken. Individually, I had and have a hankering after "Pioneer" for the third position, his drooping hind-quarters notwithstanding. He was the first yearling and the first two-year-old, still he is not such a good aged bull as he was a youngster. His carcass carries more flesh than even "Sir Arthur," and under the hand he is very pleasing. Immediately behind the fore-arm there is a slight want of filling-up, and his symmetry is not helped by a falling-off from the hooks backwards. At the same time, to my taste, there is more gaiety and finer quality about him than either the third or fourth bull displays. Mr. Atkinson's "Sergeant Irwin," a massive four-year-old, red, with a little white, bred by Mr. Linton, by the same sire as "Sir Arthur," was honoured with the third ticket. For some years this bull has been in the prize-list at leading Shows. He is well covered over the back, chine, shoulders and ribs; while the latter are well sprung, and he has a great fore-arm—always a sign of good constitution—and nice head and neck. About the tail-head, however, he is too high. Mr. W. A. Mitchell's roan bull, "Duke of Chamburgh," of Mr. Outhwaite's breeding, got all that his spirited owner could have expected in fourth. Both as a calf at Bedford, and a yearling at Taunton, it will be remembered, this animal, when shown by the breeder, was second. At present his hair is bare, and his fore-ribs and girth are not so well developed as his great quarters would require to display that symmetry or balance which is so desirable. Still, he carries an immense quantity of good-handling flesh, and grows on one as you approach him. Out of Mr. Outhwaite's famous bull-breeding cow, "Whitesocks," he is by the grand bull "Royal Windsor" (29,890). The Messrs. Gaitskell's Reserve bull "Rambler" is a lengthy, level, three-year-old white, of grand quality of flesh, excellent masculine character, straight under-lines, great brisket, and good Booth blood; his sire having been Mr. Pawlett's "King James" (28,972), and the sire of his dam, "Puff" (27,219). A highly-commended ticket was not unworthily bestowed on Mr. Bee's "Mountain Prince," a four-year-old light roan bull, of great width of chest, with grandly-filled bosom, splendid quality of flesh, and plenty of it; as also a beautiful head and neck. His tail, however, is set too high, and his hook-bones are rather "cowish." Commended tickets were given to "Pioneer;" to a substantial four-year-old roan of Mr. George Garne's that "meets you well;" to a well-fleshed but rather short-quartered red-and-white of Mr. Relph's, bred by the Rev. T. Staniforth; to Mr. Tower's "Hindoo Chief," which was third in the aged class last year, and has plenty of carcass, though somewhat hard hair, and moderately well-sprung back ribs; to a smart tidy three-year-old "Telemachus" bull, from Burghley, with grand crops; and to a wealthy heavily fleshed three-year-old son of the celebrated "Lord Irwin" (29,123), bred by Mr. Linton, and shown by Mr. Handley. Among the unsuccessful bulls were a few very well-bred sires, chiefly of Bates' blood; including a stylish lengthy white Oxford bull, from Horton; a heavy Barrington bull, bred at Holker; and a good Knightley from Havering Park.

Two-year-old bulls were not so good as the aged class. Here, also, there was not much hesitation about the first one. The Duke of Northumberland's long, deep-quartered, stylish white bull "Snowstorm," bred by his Grace, early claimed a reversal of the Birmingham award, so far as Mr. Bland's "General Fusee" and he were concerned. The white has stretched out so well, and grown so very grandly over the loin, that his claims could not be gainsaid. On the fore-rib he might be more thickly covered, but, withal, he was quite entitled to promotion from his second position of 1876 to first this year. Mr. Bland's first of 1876, however, did not even get second on this occasion. His wealth of flesh, grand middle, and good hair would have entitled him to a high place. Shortness of quarter and high setting-in of the tail pulled him back fourth. Mr. Willis's very handsome, straight, stylish "Rear-Admiral," just turned two years, and competing against much older beasts, made a popular second, in spite of his cold reception at Bath. Bred by the exhibitor, this fine bull is bare of hair just now, and is possibly also a trifle bare of carcass. There is a gaiety and style about him which attract the eye of a "Shorthorn man." Booth blood prevails in the veins of Mr. Foljambe's third-prize bull, "Lavangro" (36,887), a strong, lengthy, sappy red, bred by the exhibitor, with grand flank, splendid quarters, and nice spongy flesh. Mr. Linton's "Sir Hugo Irwin," which got the Reserve ticket, has a well-fleshed carcass. Of style he has not very much, and his tail sits on high. The commended bulls were a wide-chested strong constitutioned roan, from Prinknash, "Clovis," by Mr. Booth's "County Member," from a cow of Mr. Wood's "Premium" family; Mr. Rowley's big, soft-handling Towneley bull, "Count Towneley;" and Sir David Baird's "Baron Laurie," red, up-standing, well-topped, stylish animal, of Keavil descent.

A large and very good class of yearling bulls was topped, as the calf class was last year, by Mr. Torr's beautiful white son of "Knight of the Shire," and of Mr. Staniforth's 1000 guinea "Flower," from Aylesby, the place of his birth. The youngster might be improved in wealth of flesh; still, he has such straight top and under-lines, is so even all over, so fine under the hand, so masculine in character, and so straight on his legs, that the first ticket was worthily his, in spite of a slight lack of finish about the tail-head. The second bull, shown by his breeder, Mr. Tennant, had "Sir Arthur Ingram" for sire, and was not unlike his parent. His tail sits high, but he has a well-covered chine, deep full flank, and thick middle, with a good under-line. Mr. Foljambe's third white bull shows much breeding, has Booth blood, is good below, with nicely laid shoulders, masculine head, though only fairly good back. Mr. Relph's fourth bull is a neat little animal of the Messrs. Dudding's breeding, not very long in the quarter, but evenly fleshed. Mr. Bland's full brother to "General Fusee" got the Reserve, and merited some notice at the Judges' hands, notwithstanding a little deficiency behind the shoulder. His quality is fine, quarters splendid, and flank uncommonly good. Mr. Handley's commended bull of "Windsor" blood is a nice thickly fleshed roan, bred by the exhibitor. Noteworthy in the ticketless lot was Mr. St. John Ackers's roan bull, "Prince of Georgia," showing good quality, and full brother to the champion cow about to be spoken of. A wealthy middle with him is not backed up by equally good ends, though he was considered good enough at Bath to beat Mr. Willis's "Rear Admiral."

A fair bull-calf class was deservedly headed by Mr. Willis's "Vice-Admiral," full brother to, though better furnished than, "Rear Admiral." The winning calf is a fleshy, finely shaped, stylish, well brought-out light roan, eleven months old; not all that could be wished in the horn, and possibly a little rough in his blades, but, altogether, a good first. Lord Feversham's second calf is a level-fleshed, well-balanced roan, of excellent quality and good hair, with nice head. His sire is a "Winsome" bull. The third is a white of nice quality, straight under-lines, and level top, though already a trifle bumpy at the tail. "Carbuncle," a very tidy red of Mr. Richard Stratton's breeding and property, is admirably put together, and level in flesh. He does not, however, handle so sweetly as some of the youngsters do. Colonel Loyd Lindsay's Reserve bull might have been higher if he had not been so hard under the hand. A well-furnished young Oxford bull of Mr. A. H. Longman's showed badly on his feet. This class was not a very meritorious one; and was not equal to any of the other three bull classes. For Lord Skelmersdale's Fifty Guinea Cup, awarded to the best

Shorthorn bull, the Aylesby yearling and "Snowstorm" offered "Sir Arthur Ingram" good competition. The white yearling bull was a favourite with many. Still there was no grumbling about the cup going to "Sir Arthur," who was in capital form.

Cows were much more difficult to judge than they have been for at least four or five years back. That did not arise from any extraordinary merit so much, possibly, as from the want of it. The class, as a whole, was better than it has been for the last five years, yet there was no such cow as "Queen Mary," or "Vivandiere"—no decided first; hence the perplexity of the class to the Judges, who spent the most of two hours on it. It is not too much to say that each one of the four prize-winners had its backers for the red ticket, nor could a great mistake have been made, even if the Judges had determined the order by ballot of Mr. St. John Ackers's "Queen of the Georgians," Mr. Hutchinson's "Lady Alicia," the Marquis of Exeter's "Telemacina," and Lady Pigot's "Zvesda." At length the Judges placed the animals in the order just named. They are all well known to English Show-goers. Each has its very grand and its indifferent points. The wide chest, great bosom, extraordinary spring of rib and fine quality of flesh displayed by Lady Pigot's young cow, daughter of Mr. Booth's "King James," would have gone a long way to carry any animal to the front, as it did with her when she was the first Royal, Bath and West, and Northumberland yearling of 1875. A severe attack of foot-and-mouth disease, more than a year ago, spoiled her considerably. Between the hooks and the tail she is not now nice, and she is a trifle sharp on the top of the shoulder. These defects on each side of such a marvellously arched middle mar her symmetry. She meets one well, but, walking away, her drooping quarters bring too much of her back into view. I fancied the blooming three-year-old Telemacina, mostly of Bates' blood. She has the most level top of the lot, is most level in flesh, and is altogether the best cow to go on with. Her fore-ribs do not come so well down as could be wished, and she is rather bare below, especially forward. Had her under-line been nearly as good as her top, nothing would have touched this promising daughter of old "Telemachus." Mr. Hutchinson's "Lady Alicia," of his own breeding, was the second heifer at Taunton, and the second cow at Birmingham. For thickness round the girth and general substance she had no rival in her class. Still there is a slight coarseness as the tail-head is approached. She also was sired by "King James," as her breadth of chest and wealth of flesh indicate. "Queen of the Georgians" has been a frequenter of English Shows for some years, and has generally been "in" somewhere. Never was she in such luck as at Liverpool. Her ribs spring very well, and are well covered with flesh of fine quality; her chest is deep, and brisket great, quarters fair, but shoulders rather hard. She is principally of Booth blood, and was admirably brought out, yet she won only by "a neck." Her triumphs for the day did not end here, as will by-and-by be seen. Mr. Atkinson's "Moonshine" is a big useful cow, well covered over the chine. Still, she is deficient below, particularly towards the hind-quarters. Mr. R. Bruce's "Royal Rose," of Mr. Downing's breeding, which was highly commended, is fully as likeable a cow as "Moonshine," being nice on the shoulders, with a feminine head and neck and good underline. Mr. Graham's massive substantial-looking red cow, also highly commended, was one of the "Lauristinas" which sold well at Mr. Lamb's sale near Penrith last spring. A commended ticket was also well merited by the thick, fleshy, red cow from Auchnagathle, Aberdeenshire, bred at Sittyton, which was first at the Highland Show at Aberdeen in 1876. Over the fore-ribs and crops she is admirably covered. Her defects in the hind-quarters, however, were even more visible in the Royal yard than at the Scotch Show, where, by the way, she was lucky. Among a few ticketless cows, I noticed the Messrs. Dudding's "Blooming Bride," now owned by the Stand Stud Company. She has been a prize-taker repeatedly at the Royal, having been, for instance, third last year; she is very lengthy and big, though getting patchy, and is less blooming than I have before seen her.

With two-year-old heifers there was less difficulty. Lady Pigot's "Imperious Queen," which was the crack English Show-yard Shorthorn of 1876, has not gone on quite satisfactorily. Her calf, or something else, has shaken her considerably. Nevertheless, the exceptionally fine quality both of flesh and hair still abides by her, and her shoulders are well laid. On the other hand, her tail has somehow got to lie on or in badly, and her horns are too strong for most tastes. All things considered, she obtained—so far as the onlookers were concerned—the first ticket with a grudge. Mr. Hutchinson's "Grateful," a big, wide, roomy, lengthy, wealthy heifer, granddaughter of the famous "Knight of the Shire," and great-granddaughter of "Vain Hope" (23,102), had very strong claims to the first place; she is very well bred and is all over like her breeding, notwithstanding a tendency to bumpiness at the tail. The finest Shorthorn body in the yard was that of Mr. Angus's third-prize two-year-old roan, daughter of "Ben Brace" (30,524), a bull of Mr. Meadow's breeding. Scarcely anything of the kind could be prettier than the deep, finely filled hind-quarters, the true "ribbing up and home," the level coating of flesh over the crops, the wealthy bosom, grandly laid shoulders, straight under-lines, and nice bone of this heifer. She was, to be sure, low in the neck, rather high in the horns, and her head altogether was not quite to every Judge's taste. Lady Pigot's "Rosalba," of Mr. Joseph Stratton's breeding, is a good specimen of a Stratton Shorthorn, thick, compact, well-fleshed, nice in the head, and stylish on foot, with, however, a little bumpiness on the top of the hind-quarters; she was fourth. Mr. Handley's Reserve heifer is a level white of his own breeding, somewhat high on the leg, but straight along the top, and likely to come out well. The commended heifer has a heavy carcass—too heavy, apparently, for her back.

Yearlings were a larger and, all over, a better class. Six of the twenty-five entered failed to appear. Here the Judges did a plucky thing. The Earl of Ellesmere's very well brought out Towneley heifer, "The Lady," which was the champion female at Bath, was expected, by not a few, to carry the leading ticket in her class, and possibly something more. When hopes run high regarding the fate of any animal, it not unfrequently happens that disappointment follows; so it did in this instance, for "The Lady" was sent to her stall with only a second ticket, and it appeared to many really good judges of a Shorthorn, this was about all that she deserved against such a well-formed truly grown heifer as Mr. Marsh's roan of his own breeding. Her symmetry at once arrested the eye, and she was not long in the ring when the probability of her imperilling "The Lady's" chance of the red ticket was eagerly discussed by several breeders looking on. She has delightfully laid finely covered shoulders, is exceedingly well filled round the girth, good along the back, nice in the hind-quarters, with a head and neck in keeping with the body. The Judges ultimately put her first. "The Lady" has indeed a grand middle, magnificently covered with richly handling flesh and soft hair, while her shoulders and chine are wonderfully good. Her head, however, is not so feminine-looking as it might be, her neck is too short and so are her hind-quarters. She beat the first one in middle and wealth of flesh, but the latter is decidely superior at both ends—is, in short, a more "pointy" heifer, and, in a breeding-stock Showyard, won, I think, fairly enough. Mr. Bland's third heifer is a lengthy light roan, daughter of a Waterloo bull. She has deep good quarters, rare quality, level covering over the crops and is thoroughly feminine about the head and neck. If her shoulders had been better laid in she would be a very heavy opponent in any yard. Mr. St. John Ackers's "Second Lady Carew," a daughter of "County Member," made a good fourth. Length and quality are displayed by her, and so, unfortunately, is patchiness at the tail-head already. Lady Pigot's nice roan, "Victoria Lucida," young for the class, and a daughter of Mr. T. C. Booth's "Royal Benedict," got the Reserve. Better things appear to be in store for this well-bred, deep-quartered, not over-fed animal. A smart roan from Broomley, bred by Mr. Angus, after "Ben Brace," has good shapes; and, though handling a little hard, she deserved her commended ticket. Among the unsuccessful lot we observed some very well-bred things, including a pair of moderately fed daughters of Mr. Booth's "King Tom," from Her Majesty's herd at Windsor, and a level promising yearling from Shotley Hall, out of a Dunmore "Winsome" cow, and sired by Lord Fitzhardinge's "Duke of Connaught," the 4500 guinea bull.

The heifer calf class included some very promising youngsters, several of which are very well bred. Mr. Brassey's first calf is a thick well-furnished red-and-white, with nice shoulders, good back and fair quality, within two or three days of the maximum age. It is chiefly of Bates blood, and showed itself splendidly in the ring. Lord Sudeley's charming roan "Seraphina" heifer, by a "Winsome" bull, and half-sister to "Seraphina Bella," which headed the calf class at Hull in 1873, was a popular second. Her head and neck are sweeter than those of her half-sister, though her loins are not likely to be stronger. As at Bath, Mr. St. John Ackers's "Third Lady Carew," full sister to the fourth yearling heifer, followed closely on the heels of the Toddington "Seraphina;" they were first and second at Bath, and are really a pretty pair. Mr. George Garne's fourth calf, principally of Bates descent, if hard under the hand, is very true in its shape, and astonishingly good between the hooks and tail. The Duke of Northumberland's Reserve calf is not very sweet to handle, though well-shaped and finely shown. The commended heifer from Aldborough is a stylish little roan of Knightley and Booth blood. Mr. Miller's commended calf is a valuable red-and-white, with grand flank and fair shape, out of one of the late Mr. Torr's "Flowers." Prominent among the unfortunates were a very handsome heavy white, hard to handle, belonging to Colonel Loyd Lindsay; a splendidly brought out, deep quartered, stylish white "Winsome" of Lord Feversham's; and a lengthy even white of the Duke of Northumberland's. The Earl of Bective's thirty guinea cup, for the best female Shorthorn, was rightly given to "Queen of the Georgians" over the heifers.

The handsome contributions of the Local Committee enabled the Society to introduce, among other new features, a class for Shorthorn families—a cow and two or more of her produce. This was an interesting competition. Mr. Miller's fine old

Peepy cow, "Ringlet 2nd," of good Booth blood, with three very fine daughters and a son—the latter by "Royal Benedict"—at foot, was too strong for her opponents, and won the 50*l.* prize accordingly. Though a "round dozen," the old cow is wearing well. "Ringlet 4th" is a feminine-looking, stylish, roan, five-year old cow, and her three-year-old sister is shapely and wealthy all over. Mr. George Ashburnér's very highly bred cow, "Duchess of Kirkby" (of Bates descent), with two promising daughters and a son, got the second prize of 25*l.* Mr. Herbert's "Countess," with two daughters, deserved the third prize of 10*l.*

The Judges of the above classes report as follows:—

We consider the exhibition of Shorthorns to have been of more than average merit.

CLASS 43 was the best we ever remember to have seen at any Show of the Society. To award the first and second prizes in this class was comparatively a matter of little difficulty; but in a class where so many were good, and some of nearly equal merit, it was no easy task to fix upon the third and fourth prize animals. Our appreciation of this class will appear by the awards of highly commended and commended.

CLASS 44 was also excellent, but calls for no particular remark.

CLASS 45 was fairly good; but with regard to

CLASS 46, we must remark that, with the exception of the first and second prize calves, it hardly came up to the high standard of the previous classes.

The show of females was also very good, though perhaps there was no animal of very exceptional merit. It was with great satisfaction we found we had to award prizes to families of Shorthorns. We feel that this is likely to be a most important class, and trust that it will tend, so far at least as this class is concerned, to check that excessive forcing which extensively prevails, which is injurious to the animals themselves, and prevents those of many of the best tribes from being exhibited.

We cannot conclude this Report without expressing our thanks to the Steward of the Class for the excellent arrangements he made, so that there was no delay in the introduction of the various classes into the Show-ring.

HUGH AYLMER.
WM. SANDAY.
H. W. BEAUFORD.

Herefords.—The representatives of this fine old valuable grazing breed were more select than they sometimes are. Comparing the Hereford with other heavy breeds, it must be admitted that the white-faces are better covered over the blades, as a rule, and come earlier to a greater size than most varieties. Of course they do not "die so well" as some other breeds do; but for all that they are good rent-payers, and, as regards individual merit, they were more creditably represented at Liverpool than the popular Shorthorn. Only two old bulls appeared. The second one, belonging to Mr. Thomas, and bred by Mr. John Price, is a deep, massive, thickly fleshed 3-year-old, son of the 500 guinea bull "Horace," and second winner at Bath. Good as he is, however, he had no chance with such an extraordinary bull as Mr. Taylor's 4-year-old "Tredegar," which has carried the highest honours of his breed over and over again, and beat "Sir Arthur Ingram" and all other bulls for the cup at Croydon, in 1875. What a brisket he has—within a few inches of the ground! Then his long well-packed quarters, well-covered loin, great size, majestic step, and noble head and neck, rivet the admiration of any fancier. Two-year-old bulls were a good class. Mr. Taylor has more good bulls than "Tredegar." He topped the next class with a thickly fleshed bull of rare quality and great size, which was first at Bath, and headed the Birmingham and Hereford lists of 1876. About the top of the tail Mrs. Edwards's second bull might be better, and his blades are not so well covered as those of some of his rivals are, but he is grand below, and carries a great deal of flesh. He was second at Birmingham last year. Mr. Lister's third bull has, if anything, too heavy horns, is well-fleshed, and handles very kindly for a Hereford. The decisions in the yearling bull class played havoc with the order at Bath. The Wintercott first bull at Liverpool is very gay, with fine quality and unusual style, though his blades are rather prominent. He was highly commended at Bath. Mr. Taylor's second bull, "Telescope," a son of "Tredegar," was the first Birmingham calf, and was unsuccessful at Bath. With deep thighs, grand loin, and great substance, his slight defect, in the form of somewhat rough shoulders, had to be weighed in this case with more favourable results than at Bath. Mr. Carwardine's second bull at Bath, also second calf at the previous Royal Show, was third at Liverpool. His blades are well covered, though he is not so good in his girth. Mr. Taylor's Reserve bull, another son of "Tredegar's," was highly commended at Bath, is a stylish animal, not so well covered on the loin, nor so good behind the shoulder as the second one from the same herd. A bull of fine quality, if flat rib, from the Royal Flemish farm, was left "out in the cold."

In my opinion, the prettiest young bull of any breed in the yard was Mr. Carwardine's well-grown and truly handsome son of the famous cow, "Helena." Of large size, this gem of a calf is covered over the loins, rump, and quarters as well as the most fastidious could wish, while his character is at once striking. The second one, from the same herd, is a straight good calf, a shade too strong, possibly, in the horn. Mr. Tudge's third calf is very promising, though not so well made-up as the first and second.

Excellent as the bulls were, the cows and heifers were even better. The grand 9-year-old cow, "Rosebud," the property of Mr. Tudge, Adforton, was once more adjudged the premier position, notwithstanding the very formidable presence of Mr. Carwardine's grandly-shaped, deep, wealthy carcassed three-year-old "Helena," which was first at Birmingham in the senior heifer-class last year. "Helena" is deeper in front, and is a very taking, picturesque cow, laden with flesh, yet has begun breeding most successfully—witness her bull-calf, first in his class. As a type of a cow, however, I should prefer, as the Judges did, "Rosebud," which was first at Birmingham last year. She has not such short legs as Helena, but she has more cow character, being grand over the hooks, and beautifully covered on the chine, shoulders, and fore-ribs with flesh, to touch which is a perfect treat. Though up in years, she is still blooming. She calved about the days of the Show, and of course that was so far against her appearance. By some informality of entry, we heard that the first money prize would go to "Helena," who had added to her previous three firsts at the Royal, a first ticket at Bath in June last. The other cows placed were good useful animals.

The same three two-year-old heifers which won at Bath, did so here in exactly the same order. Mrs. Edwards's "Mabel" has great spring of rib and grand deep front. She is, however, getting patchy behind. Her previous honours include first at Birmingham in 1876, and first at Croydon in 1875. The second and third are well-furnished well-bred heifers, the third having been the second yearling at Birmingham. Mrs. Edwards's pair of invincible yearling heifers were objects of much admiration by many more than "Hereford men." They were first and second at Bath in the same order as here, and stood at the top of the calf class at Birmingham, the second then being first now. She is the best, in the meantime, of a very beautiful and wonderfully well-brought-out pair, inheriting some of the finest old blood, and worth going a long way to see.

The only two heifer calves shown were the first and second Bath winners. Mrs. Edwards's first one is very promising, and is out of the same cow as the second yearling; while Mr. Taylor's second is a stylish little daughter of "Tredegar." Cows and two or more of their produce were well represented.

The Judges report in these terms:—

Having been requested to write a Report on the "Herefords" which came under our notice at Liverpool, we will endeavour to be as brief as possible, and will only say that we consider that if the white-faces were not so fully represented as in former years, there were many amongst those exhibited which well maintained the high position which this breed of cattle so well deserves, showing character, quality of flesh, and scale sufficient to satisfy the most particular judge of stock.

Francis Evans.
William Groves.

Devons.—So remote from the heart of the Devon country, a large display of this, the most plump and compact of all British breeds, was out of the question. Doubtful cards would not be sent so far, which accounts for the comparative absence of inferior beasts in the Devon classes at Liverpool. It was generally admitted that the nicest aged bull in the yard was Viscount Falmouth's three-year-old Devon, "The only Jones," which easily headed the aged class, and was champion bull in a canter at the late Bath Show. On short legs, this marvel of a bull stands straight and very even, while there was undoubtedly no such uniform and deep covering of the finest of flesh over any other animal in the yard of any conceivable description. The noble Viscount has great credit, indeed, in breeding and turning out such an animal as this. Mr. Farthing's second prize four-year-old of his own breeding is an excellent bull, and won first prize at the Hereford Show of the Bath and West of England Society last year, but was never intended to cope successfully with Viscount Falmouth's bull. That nobleman's first-prize two-year-old bull was second at Birmingham last year, and has long deep quarters and a level coating of flesh. The first yearling bull from the same herd is above average merit. Mr. Farthing's second, a stylish yearling, was the first calf of 1876, and looks like being further heard of. His dam is the first-prize cow. Mr. Farthing's first bull-calf is even more promising, and was first at Bath. The sire of this calf was "Master James," a bull with which his owner stood first at the Birmingham Royal Show. Mrs. Langdon's second and third calves are evidently well-bred, and were in the prize-list at Bath. The first-prize cow from Stowey Court, where she was bred, is an immense barrel of beef, on short fine legs. She has won three or four Royal firsts, besides other honours, and happily does not appear to be anything like done. Scarcely anything could be finer in the bovine line than the manner in which this animal has taken on a load of flesh on a nice frame. She was not eligible at Bath this year, and Mrs. Langdon's second cow here was first there, and a beautifully brought-out animal she is. Mr. Farthing's nicely developed heifer, approaching three-years-old, bred by Mr. Senior, is a very pretty prime specimen, having been first at Bath, and Reserve in the contest for best female in the yard. The Liverpool Judges reversed the Bath decision in the yearling heifer class. Mr. Farthing's second one here was first there; and Mrs. Langdon's Liverpool first was second in the South. The Flitton heifer is stronger on the back than the Stowey Court one, which is so much in favour of the Royal award. Mr. Farthing's first-prize calf is not big, but what a charming picture it is! It seems all but impossible to establish a fault in it. First honours fell to its lot at Bath, and at the Devon County Show; and, as the Judge's Report indicates, it is out of the first-prize cow, which, together with the second-prize yearling bull, testifies to her valuable breeding properties. The second calf, from Stowey Court, is higher on the legs. It was not at Bath; and Mrs. Langdon's third here got second honours in the South. The Judge's Report proceeds as follows:—

> "The show of Devons, although small in numbers, was a good one as regards the excellence of the animals exhibited.
>
> In the old bull class there were only two entries. The first-prize bull is a very superior animal, with good substance and great symmetry. The second-prize bull was a very thick-fleshed useful bullock.
>
> In Class 62 the competition was again confined to two animals; but they were both of great merit and do great credit to their breeder, and will doubtless be heard of again in the Show-ring. The Yearling and Calf Classes were well represented. The first-prize cow is an animal of extraordinary excellence, and combines great size with almost perfect symmetry and true character. The second was a very smart, thick-fleshed, promising young cow.
>
> Amongst the heifer and calf classes there were some very superior animals, especially the first prize in the yearling class and the first and second-prize calves. The first-prize calf is a daughter of the first cow, and promises to be a worthy successor of such a dam.
>
> The Sussex, and Norfolk and Suffolk Polled Classes, being a long distance from home, contained but few entries, but amongst them were some good specimens of their respective breeds.
>
> James Tremaine.

Channel Islanders.—In these breeds competition was confined to the Jerseys, of which there was a capital representation. The Judges have kindly furnished such an elaborate and valuable Report, that I shall only enumerate a few of the previous victories of the prominent animals. Mr. Simpson's second aged bull was first at Bath, and the fourth one second, but the first here was absent. Mr. Simpson's first yearling bull was second at Bath, when the one now third was first. The first-prize cow above three years old, I was informed, gives 45 lbs. of milk daily, and 1·5 lbs. of butter weekly. She is a beauty. The first two-year-old heifer was second at Bath; her conqueror there being now absent. There was no disturbing of decisions in this instance.

The Judges report in the following interesting terms:—

> Class 69. *Jersey Bulls above Two Years old.*—Ten animals were entered, Nos. 590–599, but only nine were shown in the ring (No. 594 being absent). With the exception of the prize-takers, the entry in point of quality was merely moderate. No. 590, the first prize, "Father Joseph" (2 years 4 months), bred by the exhibitor, Mr. Thomas Horrocks Miller, is a silver grey, with a very beautiful head and fine horns, possessing a considerable amount of quality, and is likely to prove a most useful bull for producing good-milking stock. No. 595, the second prize, "Romeo," bred in the island and exhibited by Mr. George Simpson, is only seven days older than the above bull, and is an animal to be admired, showing many good points; his loins and body are

stronger than those of his more successful competitor, but in comparison he does not show the blood-like and milking points in his head and horns. No. 591, the third prize, "Fanfaron," bred by Mr. Walter Gilbey and shown by Lord Chesham, is 8 months older than the above bulls, and combines good looks with some fine qualities. No. 596, commended and reserved, "May Duke," was bred and exhibited by Mr. George Simpson.

CLASS 70. *Jersey Bulls above One and not exceeding Two Years old.*—Seven animals entered, Nos. 601–607, but only five were shown in the ring (Nos. 601 and 604 being absent). The entry, although small in number, was excellent in quality throughout. The three prize animals possess many exceptional points of merit. No. 605, the first prize, "The Pride" (1 year 5 months), bred in the island and exhibited by Mr. George Simpson, is a dark brown, but described in the Catalogue as a grey. This animal's blood-like points, so appreciated by the Jersey breeders, obtained for him the red ribbon; his horns, perhaps, might be considered too curly, but in all other respects he will be found hard to beat. No. 606, the second prize, "Gauntlet," a silver grey, bred by the exhibitor, Mr. George Simpson, 4 months younger than the above, is also full of promise. No. 607, the third prize, "Gipsy Lad," bred by the exhibitor, Mr. Herbert Addington Rigg, is the exact age of the first-prize bull (1 year 5 months), and got by "Gipsy King," the same sire as the second-prize animal. In any ordinary exhibition this animal would have taken the principal honours, and in such a good class as the present he may be described as possessing good looks and rich milking qualities sufficient to make him valuable in any Jersey herd. No. 603, highly commended and reserved, "Jehu," bred by the exhibitor, Sir David Baird, Bart., is a very useful bull, with a plain head.

CLASS 71. *Jersey Cows above Three Years old.*—Twelve animals entered, Nos. 608–619, but only ten were shown in the ring (Nos. 612 and 618 being absent). The all-important properties of a dairy cow were here exemplified (capacious udder, broad at its base, extending well forward and well backward, with skin loose and elastic, the teats evenly distributed): in point of excellence we doubt if ever at any Show in England so many good animals came into the ring, all possessing, as these did, symmetry, fineness of breeding, and richness in milk-producing points. No. 615, the first prize, "Luna" (3 years 4 months), bred in the island, was exhibited by Mr. George Simpson. No. 619, the second prize, "Young Fawn" (3 years 10 months), bred by the late Sir Joseph Hawley, Bart., was exhibited by Mr. H. A. Rigg. No. 614, the third prize, "Venus" (3 years 6 weeks), bred in tha island, was exhibited by Mr. George Simpson. No 616, highly commended and reserved, "Lemon Peel 2nd" (3 years 3 months), bred in the island, was also exhibited by Mr. George Simpson. No. 609, highly commended, "Haphazard" (3 years 7 weeks), bred by Mr. Walter Gilbey, was exhibited by Lord Chesham. No. 617, highly commended, "Laustunina" (4 years 3 months), bred by Mr. E. Marjoribanks, was exhibited by Mr. William H. Wakefield.

CLASS 72. *Jersey Heifers in-Milk or in-Calf, not exceeding Three Years old.*—Ten animals entered, Nos. 620–629, but only nine were shown in the ring (No. 629 being absent). The entry was short compared with the Birmingham Show last year, when it comprised no less than 33 animals; the good and high breeding, however, of a portion of those which came before us compensated for the deficiency in numbers, and it may be safely said that they possessed beauty, and all points necessary both for quantity and rich quality of milk. No. 627, the first prize, "Promise" (2 years 5 months), bred in the island, was exhibited by Mr. George Simpson. No. 626, the second prize, "Pretty Girl" (2 years 2 months), was bred and exhibited by Mr. George Simpson. No. 620, the third prize, "Maid of Athens" (1 year 8 months), bred by Mr. Walter Gilbey, was exhibited by Mr. Edmund B.

Gibson. No. 621, highly commended and reserved, "Ella" (2 years 5 months), was bred and exhibited by Lord Chesham. No. 628, commended, "Flirt" (under 3 years), bred in the island, was exhibited by Mr. H. A. Rigg.

Class 73. *Guernsey Bulls above One Year old.*—No entry.

Class 74. *Guernsey Cows above Three Years old.*—Only one animal entered, No. 630, the first prize (3 years 10 weeks), bred in the island, and exhibited by Mr. Herbert Spencer Woodcock. This is a well-proportioned cow, showing good milking qualities.

Class 75. *Guernsey Heifers in-Milk or in-Calf, not exceeding Three Years old.*—Only one animal entered, No. 631, "Muriel" (2 years), bred and exhibited by the Rev. Walter Sneyd. This animal, being unfortunately entered in the wrong class, as she is a Jersey and not a Guernsey, was disqualified.

As previous Judges have before advised alterations and additions to the prize lists, we venture to bring our views to the notice of the Council.

We are sorry that we are unable to report favourably of the entries in the Guernsey Classes; the prizes, amounting to 75*l.* in the three classes, failed to attract animals to the various exhibitions, and this year at Liverpool only one cow put in an appearance. We would therefore suggest that the usual three classes be reduced next year to the following single class, namely, for "Guernsey Cows in-Milk or in-Calf, without restrictions as to age," or else that there be no special class for Guernseys. In introducing this latter alternative, it may be well to remind the Council that the Guernsey Cow will not be shut out from future Shows, as she can be entered in the "Dairy Cattle Class (without pedigree)."

In reverting to the Jersey breed, it is indeed most satisfactory to trace its gradual development and increasing popularity, as evinced by the entries at all exhibitions of the Society since that at Manchester in 1869. The average yearly entry has now reached forty-four. This affords us one reason why we deem the breed worthy of still further encouragement. Moreover, as this is by no means a meat-making, but especially a milk-producing breed, it is of the highest importance that the milk-properties shall be developed as early as possible, hence we take the liberty of recommending the introduction of three additional classes for younger stock of the Jersey breed, making in all, the following seven classes:—

Bull above Two Years old.
Bull above One and not exceeding Two Years old.
*Bull-calf above Six Months and not exceeding Twelve Months old.
Cow above Three Years old.
Heifer in-Milk or in-Calf, above Two and not exceeding Three Years old.
*Heifer in-Milk or in-Calf, above One and not exceeding Two Years old.
*Heifer-calf above Six Months and under Twelve Months old.

Those marked with an asterisk are the additional classes.

Walter Gilbey.
Henry Tait.

Sussex.—In no class of this useful meat-making South-east of England breed did the number in competition exceed three. Curiously, there were two entries in each of the three bull classes, and three in each of the cow and heifer classes. Quality, it is important to bear in mind, did not suffer in the same proportion as numbers did. On the contrary, the display, though small, was of high merit, so far as it went. The Messrs.

Stanford's first-prize aged bull is well covered with flesh, and was first at Croydon in 1875, as well as second at Birmingham last year. Their second prize two-year-old and yearling bulls are full average specimens, shown in good condition. Their first-prize cow is a lengthy stylish seven-year-old, which stood second at the last Royal Meeting; and the second-prize two-year-old heifer was similarly placed at Bath, when Mr. Agate's first one here was also in possession of the coveted ticket. Mr. Agate's first yearling is lengthy and outcoming. She has been a winner before; while his second-prize yearling bull, carrying his flesh well, was second at Bath. Mr. George Smith's first two-year-old bull easily backed up his Bath triumph, and has evidently more victories in store for him.

Norfolk Polled.—The Norfolk and Suffolk Polled breed was meagrely represented. Mr. J. J. Colman, M.P., sent a good bull and a better cow; while Mr. Birkbeck forwarded a fair bull and a moderately good heifer, which composed the show of red Polled cattle.

Welsh.—This breed was in great force. The Judges, as will be seen, report fully on this stock, so I need not extend my own notes. The second-prize aged bull, though nothing like the first for quality and symmetry, was of immense size. If I mistake not, he was the heaviest animal in the cattle classes. I was favourably impressed with Mr. Humphrey's prize cows. They were the best specimens of Welsh cows that I have seen, and were shown in capital trim. Heifers were also good.

The Judges of this breed report in these terms:—

CLASS 85. *Bulls over Two Years.*—In this class there were nine entries, fairly representing this hardy breed of cattle. The first prize was awarded to a two-and-a-half year old bull of great merit, likely to develop into a thoroughly good specimen of the breed; the second-prize bull, five years old, is a heavy well furnished beast, lacking the quality of the first; the third prize, taken evidently from North Wales, is a promising beast, with good symmetry.

CLASS 86—*Bulls under Two Years old.*—These were not so well represented, the lot lacking quality.

CLASS 87. *Cows in-Calf or in-Milk.*—All the prize-takers in this class were of great merit—the first and second-prize cows being thorough good specimens of the North Wales type, the third prize and Reserved Number cows nearly equally well representing the South.

CLASS 88. *Heifers under Three Years old.*—An uneven class, some being inferior animals, and the prize-takers very good. The first-prize heifer, evidently from the North, is good all over; the second and third are a pair of grand heifers, with good coats, but lacking the touch of the North Wales heifer.

We had considerable difficulty in making our awards, as the cattle of North and South Wales are of totally different types, both good, and well adapted for the districts in which they are bred. We would suggest that, in future, prizes be offered in separate classes for North and South Wales cattle.

It is much to be regretted that the black breed of cattle are not more strictly adhered to in the mountainous districts of Wales, where they thrive-on scanty fare, and make beef of prime quality when transferred to good pasture. If better fed and cared for during the first two years, they would compare favourably with any breed of English cattle.

Welsh sheep were an indifferent show, both in numbers and quality, the prize pens of ewes being the only good specimens of the breed. Considering the handsome prizes offered by the Society, we cannot refrain from expressing our regret that this useful breed of sheep was not better represented.

A. Laurie.
John Williams.

Longhorns, Ayrshires, Galloways and Dairy Cattle.—Of neither of these sorts was there a large or a very good display. Ayrshire and Galloway breeders should have responded more numerously to the invitation of the Royal Society. The Duke of Buckingham's first-prize Longhorned bull is heavy and fleshy. Mr. Forrest's second one has not such a nicely set tail as the first. Mr. Farmer's first-prize cow carries a grand udder. Mr. Richard Hall's first-prize heifer is a beauty of her sort. Among the six or seven Ayrshires there was nothing of a particularly noteworthy character. Mr. George Graham's first-prize Galloway bull is a handsome two-year-old, which has been a leading winner in his own country. Mr. James Cunningham's first-prize heifer is very handsome, and has never been beaten. She has a fine coat of hair, and was bred by the exhibitor. The same breeder's second and third cows have been prize-takers before. They, too, were bred by himself. Mr. Richard Stratton's first-prize pair of cows of any breed, in-milk, were two sappy useful-looking Shorthorns of his own breeding. Some good dairy cows were exhibited. The Judges of those breeds report as under:—

Class 89. *Longhorns.*—The first-prize animal exhibited all the best qualities peculiar to the Longhorns, and was shown in fine condition; the second and third prize animals though well worthy of their premiums, were not so fully developed as the first prize.

Class 90. The first-prize cow is a very complete one, shown in satisfactory condition, milking properties well developed; the second and third are good cows, but their milking properties are not so apparent; the Reserve Number, though in low condition, had every appearance of being an excellent dairy cow.

Class 91. Three very good heifers, the first prize of superior quality.

Class 92. *Ayrshires.*—First-prize animal a very superior one, in fine condition; second and third animals in low condition, but evidently purely bred.

Class 93. Generally good, exhibiting very fully those milking properties for which this breed of cattle is justly celebrated.

Class 94. *Polled Galloways.*—Only two exhibited (sire and son); considered very excellent specimens of the breed.

Class 95. In this class there were some fine animals; the first-prize heifer showing promise of making an excellent cow.

Classes 96 and 97. In these classes the Judges considered that their attention was by the conditions particularly directed to the milking properties of the cows exhibited, and their awards were made in conformity with those directions.

Signed, on behalf of the Judges, J. H. Burbery.

SHEEP.

For a considerable number of years back the breeding, rearing, and fattening of sheep has, as a rule, been more remunerative to English farmers than any other kind of stock-farming. Sheep-farming is generally better attended to than cattle-rearing in England. Whether this is due to the more encouraging returns, or whether the larger profits are attributable to the better management, I need not stop to inquire. As on the English farm, so in the Showyard, the fleecy tribe take a prominent position. This year the display of sheep quite maintained the high reputation of the leading English breeds. One interesting feature in this department at Liverpool was, that in several of the classes the more distinguished breeders were unable to hold their own against the younger or less widely known exhibitors. This fact, of course, might signify more than that the younger men were spurring on; it might mean that the celebrated men were falling off. This last is not the sense in which I wish to convey the statement to my readers. There can be no doubt that the hitherto less fortunate exhibitors are progressing, which is a hopeful sign.

Leicesters.—The Catalogue gives the first place to this fine old breed, of which there was a capital representation. Competition in the shearling-ram class was very strong. About the destination of the first ticket, however, a short examination could have left no doubt in the mind of any Judge. Nothing in the large class could have fairly claimed the premier ticket from Mr. T. H. Hutchinson's finely woolled, symmetrical, well-covered ram of his own breeding. The animal's loin was strikingly good, his head and neck excellent, and bone very superior. He was very well brought out—as Mr. Hutchinson's Showyard animals of any variety usually are—and was sired by Mr. Hutchinson's winning shearling at the Taunton Royal, in 1875. Mr. George Turner, Jun., who was in indifferent luck at Liverpool, had a pretty strong pull for second, with a stylish sheep of his own breeding, which showed nice countenance, plenty of length, good quality, and excellent character. His shoulders and his fore-rib are not particularly well covered.

Mr. John Borton's third ram was better over the shoulder, and is a well-furnished handsome animal, very strong in the loin and good on the rump. A stylish sheep, not very good at tail-head, from the same flock, deserved his commendation.

Mr. Creswell's Reserve ram, from Ravenstone, was the biggest sheep, to all appearance, of the prize lot. For some people's taste, however, he handles just a little too soft on the back.

Mr. Borton and Mr. Turner had some lively work in the aged ram class. The race was close. Mr. Borton, however, finished best, having got first and third for a pair of well developed three-shear sheep, bred by himself. The first ram has a grand neck, great width of chest and fore-rib. The third one is also good forward. On the loin he might be better, while he is hardly so well made-up as Mr. Turner's second ram, also a three-shear, and bred by the exhibitor. The Thorpeland's sheep has a broad, well-covered top, well-sprung rib, great rump and good quarters. Possibly a little more covering over his shoulders might have pulled him higher. Mr. Thos. Harris's two-shear ram, Reserved, has splendid ribs and good shoulders. Mr. W. Brown's commended sheep excelled in wool.

In the gimmer class, the Yorkshire breeders were harder than they commonly are on the distinguished Northamptonshire "Leicester man." The Eastburn pen, owned by the Executors of the late Mr. F. Jordan, have immense wealth for their age, both of mutton and wool. Bigger animals of the breed I have seen, but finer woolled, more symmetrical gimmers are not met with in every flock. They were decidedly first. Mr. Brown's second pen display family character and careful feeding. Mr. Turner's third ones are sweet about the heads, and good on the backs. They are, if anything, on the short side, and would be improved by a little more size. Mr. Hutchinson's pen was Reserved.

The Judges report in these classes that the display was good, and that they were glad to observe a considerable improvement in the representation of this variety as rent payers.

Border Leicesters.—A large display of this breed was expected at an exhibition within comparatively easy access of the Border Counties, where this very useful breed has its stronghold. The prizes were more liberal than anything these breeders have been accustomed to in their own country, and it was rather disappointing to see only three or four exhibitors represented. The quality of Mr. Melvin's and Mr. Tweedie's Leicesters, however, was very good, and they made a good but, of course, numerically small display. They divided the honours. Mr. Tweedie, who deserves great credit for the manner in which his Leicesters are brought out on a strong clay Yorkshire farm, had no competition with his ponderous 4-year-old ram, "Fitz-James," of his own breeding. This ram weighed 34 imperial stones at the time of the Show, and was, seemingly, the heaviest sheep in the yard. His broad level back is well covered, fore-ribs spring well, quarters are good, fleece fair, and bone good for the size of the carcass. His head may be rather defective in covering, and his mutton is beginning to fall a little. Still he is a great sheep, chiefly of Rock blood. Mr. Melvin, Bonnington, Mid-Lothian, beat Mr. Tweedie in the shearling-ram class. Mr. Melvin's first ram is exceedingly handsome. So far as it goes, his body is almost perfection, but the animal is on the small side. His symmetry, rump, bone, and skin cannot fail to enlist admiration. On the head he could be improved. Nevertheless he was a popular first, as he was at Glasgow in the spring. It is seldom that a better matured sheep of the breed than this one is seen. The sire of him was a Polwarth ram. The second one, from the same flock, has more length, equally good skin, nicer head, and "turns" better than the first. The second is not, however, so symmetrical, being imperfectly covered over the fore-rib and shoulders, but he looks the better sheep to go on with, and was sired by Mr. Melvin's crack shearling of 1875, for which 100 guineas were refused. Mr. Tweedie's third ram is a stylish, lengthy, outcoming sheep, with good bone, well-covered back and nice head. An unsuccessful one from the Forest had a grand fleece.

Mr. Tweedie turned the tables on Mr. Melvin in the gimmer-class. The former got first, second, and fourth with three useful pens, very well brought out. Mr. Melvin only got third. The Yorkshire gimmers turned better, and had stronger necks and possibly better loins than the Lothian lots. The latter, however, had the best of it in wool, rump, quarters, and style, so that it was not surprising that the Border Judge evinced a lingering fondness for the Lothian pens.

The Judges, who acted also in the Cheviot classes, report as follows :—

The Border Leicesters were small in number and were indifferently represented. Several sheep, moreover, the Judges did not consider belonged to the class. The Cheviots were not great in number, but were of superior quality.

John Clay.
Geo. Rea.
Jas. Simond.

Cotswolds.—The office of Judge in these classes was no sinecure. Entries were numerous, and in several cases individual merit was great, as well as nearly equal. With the recent Bath decisions somewhat perplexing havoc was played. Mr. Gillett's first shearling at Bath was only commended here; while the commended one there was at the top at Liverpool; the third one here, from Oaklands, having been second at Bath. There was, however, an interval of five weeks between the Shows, and animals alter a good deal in that time. The Liverpool awards were generally supported by the spectators. The commended shearling has a beautiful head, good skin, and fine quality; his mutton, however, is slacker than it was at Bath. This animal and the third one are twins, and a pretty pair they are. The first one here is also of good quality, and carries his mutton better than any of his opponents. Mr. J. J. Godwin's second ram has magnificent wool, and is all over a stylish good useful ram, not quite so firm under the hand as the first. Mr. Brown's commended rams are heavy well brought-out specimens. Mr. Russell Swanwick's commended shearling is handsome, and handles fairly. His two-shear rams, which were invincible at Bath, were beaten here. The third one was first at Bath, and is a very level well-furnished ram, of rare quality and nice character; his skin is not so good. Mr. Samuel Smith was lucky in getting first with his big useful-looking specimen bred by himself. This ram has great length, but it did not appear to me that he carries his mutton so well as Mr. J. J. Godwin's second: the latter animal is very gay and symmetrical, with well-turned ribs and nice quality of mutton. Mr. Gillet's successful gimmers at Bath were beaten at the Royal. His third pen were first there; they have more family likeness perhaps than the others, and their skins match. Mr. Robert Jacob's first gimmers are good along the back; their mutton is all right, if their skins only harmonised better. Mr. Godwin's second pen look like making good ewes.

The Judges report thus:—

CLASS 104.—Are well represented as to numbers, and of fair average quality.

CLASS 105.—The entries are not so numerous as Class 104, but the prize animals are very good, and the class generally is commended.

CLASS 106 contains five entries, and are fair representatives of the breed.

ROBT. GARNE.
THOMAS WALKER.

Lincolns.—These heavy mutton and wool growers were in good form. The Judges, it will be seen, allude to overfeeding displayed by some of the Lincolns. Several of the lots were in very high condition. The shearling ram class was a very strong one. Mr. Garfit has credit in taking first and second in such company, with a pair of wonderfully well brought-out rams of his own breeding. The first one handles very satisfactorily, and has a good front; though in the gigot the second one has the best of it, and he has an immense fleece too. Mr. Thomas Cartwright's third ram has a gay front and stylish gait, with good rib and wealthy middle. On the rump, or near the tail, he is not so good as could be wished. Mr. Wright's fourth sheep is a very thick well brought-out animal. The Messrs. Dudding's Lincolns did not handle quite so well as usual, and so were less successful than they commonly are. Mr. Henry Smith's first-prize aged ram has extraordinary rump development, with a heavy carcass and coat, and fair character. The other sheep in the class were highly fed well-bred animals.

Gimmers were a remarkably well-filled class; the contest was very keen. Mr. Pears' first ones are big, heavily woolled animals, carrying their mutton very satisfactorily. Mr. Cartwright's second pen, like Mr. Robert Wright's third, were shown in blooming condition, being well clad both with wool and mutton. The Messrs. Dudding's fourth gimmers display much style and family character.

The Judges say:—

CLASS 107.—The Judges consider this class very good.

CLASS 108.—This class was not up to the usual form, several of the sheep being overfed.

CLASS 109.—This class was of unusual merit and very strong as regards the number of entries, and the quality of the animals.

TOM CASWELL.
CHARLES CLARKE.

Oxfordshire Downs.—These big, mutton-producing, very early maturing sheep were well represented. Mr. Druce did not maintain his wonted position in the shearling ram class. He succeeded, however, with old tups. Mr. Druce's, Mr. Street's, Mr. Treadwell's, and Mr. Brassey's sheep were very well brought out, showing good blood and first-class feeding. The Oxfordshire Down is a sheep that deserves a great deal more attention from British farmers than it has yet received. Nothing can beat it for early development, and both the mutton and the wool command a good price. Mr. Treadwell's winning shearlings at Bath failed to get to the top place at Liverpool; that distinction was reserved for a stylish, well clad, level ram, shown by the breeder, Mr. Frederick Street. Mr. Treadwell's second, third, fifth, and commended sheep were shown in capital trim, and, like the whole flock from which they emanated, they display careful breeding. The Bath order of these sheep was altered somewhat. Mr. George Street and Mr. Brassey were creditably in the race, Mr. Druce made up in the aged ram class, where first and second honours awaited him with very heavy, wealthy, finely balanced rams, of his own breeding, which were in a like position at Bath. The first one here—a very well made up sheep, profitably clad with both wool and mutton, and nicely brought out, won the cup at Bath as the best sheep in the yard; his quality and wealth of flesh at once commended him.

The other prize rams in this class compared favourably with the aged classes of other breeds. A meritorious class of gimmers also saw a reversal of the Bath awards, Mr. Druce's first pen in the South got only third here. They showed wonderful quality, stylish heads, and fair carcasses. Mr. George Adams's second pen in the South was promoted to leading honours. They are a pen of big sheep, one of which did not, however, match very well with the rest; but all of them had beautiful heads and stylish gait. Mr. Treadwell deserved his second and commended tickets.

The Judges report in these brief terms:—

CLASS 110.—A very superior class of sheep.
CLASS 111.—Some very good sheep.
CLASS 112.—Well represented.

JAMES E. RAWLENCE.
HENRY OVERMAN.
EDWARD LITTLE.

Southdowns.—These were a large, and, as is customary, a very beautiful show. The Southdown takes the place among sheep that the Devon does among cattle. Its symmetry is charming, and the manner in which these animals and the Shropshires are dressed in the wool reflects, to say the least, credit on the taste and care of the shepherd or Showyard trainer. With shearling rams, Lord Walsingham and some other celebrated breeders had stiffer work than they generally have. Sir N. W. Throckmorton, Bart., was not easily disposed of. Here, again, the Bath awards were upset. The Prince of Wales' stylish, very handsome ram, which was first at the South-Western Meeting, failed to find a place, and Sir William's first-prize sheep was only commended at Bath. The first ram has fine quality of flesh and good quarters. His head, however, is not nice, nor is he very good in front of the shoulders. Mr. Rigden's second ram is better forward than the first, if the quality had only been as good. The other pens noticed by the Judges are very good sheep.

The aged-ram class was not so large. In it Lord Walsingham retrieved what he lost among the shearlings. The rams with which his Lordship was first and second were bred by the exhibitor, and were two years old. The first one was the champion Royal shearling of 1876, and was first recently at Bath. His ribs have plenty of spring and covering, his back handles well, and his symmetry is very attractive. Mr. Jonas's third ram is good forward, although less inviting on the rump. The Duke of Richmond and Gordon got reserve and commendation for a pair, which worthily represented the nice old flock at Goodwood. The awards in the gimmer class supported those at Bath. Sir William's first gimmers are well matched and tastefully dressed. His Royal Highness's second pen are tidy little animals, full of bloom; while Lord Walsingham's formed an attractive lot, and handled well.

The Judges of Southdowns and Hampshire Downs report as follows:—

CLASS 113.—This class was not quite up to the usual standard.

CLASS 114.—Not largely represented, but the animals were of great merit, especially the first-prize sheep.

CLASS 115.—A very good class, with one or two exceptions.

CLASS 119.—There were only three sheep exhibited, but we considered them fully entitled to the prizes. The first-prize sheep in this class was a remarkably fine animal, and of extraordinary quality.

CLASS 120.—This class was but moderately represented.

CLASS 121.—This was a remarkably good class; seldom has there been a better lot of Hampshire Down ewes exhibited.

J. S. TURNER.
JAMES E. RAWLENCE.
EDWARD LITTLE.

Hampshire Downs.—The last three classes in the immediately preceding Report refer to this breed, of which there was a good display. Competition was limited in each case, but quality was excellent. Mr. Alfred Morrison's first-prize shearling ram is a remarkably well-grown, handsome, stylish animal, which is not likely to have been heard of in the Showyard for the last time. The second, from the same flock, is a good ram. With the first, however, he had no business. The third ram, owned by Mr. Henry Lambert, was in good form, and showed careful breeding. Aged rams were not so good as shearlings. The Messrs. Arnold's first ram has good wool, and bears his mutton well. Mr. Lambert's second and Mr. Morrison's third sheep are above average merit. Gimmers were relatively a finer show than tups. The Messrs. Palmer's first pen are evidently well "come," and were creditably placed before the Judges. Mr. Rigg's second pen, like Mr. Parsons's third, are stylish gimmers, bred by the exhibitor.

Shropshires.—By far the largest entry of the fleecy tribe was of Shropshire shearling rams, of which there were sixty-two. Like Lord Walsingham and Mr. Druce in their favourite breeds, Lord Chesham was unable to reach the red ticket in the shearling ram class. The noble Lord, however, secured fourth and fifth honours for the famous Latimer flock. The second ram's rib is so good, and his wealth so great, one would think that it must be a grand animal that would beat him. Mr. Townshend's first ram is a beauty, showing great neck, strong good quarters and thighs, with level well-covered top. The third and commended rams, from Dudmarton Lodge, have character and constitution to recommend them. Mr. Thomas Mansell's highly commended ram has very superior hind-quarters, and good loin. Behind the shoulder he could be better filled up. Lord Chesham's first old ram is a three-shear, which was first as a shearling at Taunton in 1875. This animal looks well, and handles better. Mr. Thomas Mansell's second and commended rams bear their mutton very satisfactorily, and have good heads with fair necks. Lord Chesham's first Bath gimmers kept their place here, strong as the class was. They are very promising, being finely woolled, and fairly sized, with symmetry that is not encountered every day. Mr. Francis Bach's second pen, and Mr. Thomas Nock's third, have nice heads and fair carcasses, with decided Shropshire character.

Lord Chesham's first-prize aged ram has been disqualified, because he was inadvertently entered a year younger than he is. The others placed are consequently promoted in their order.

The Judges' Report runs thus:—

These sheep were again numerously represented. As a whole, they cannot be pronounced otherwise than good; but some specimens were such that we consider should not be exhibited in the Royal Showyard, and we regret to see again several specimens with dark skins and grey wool. The interest of the public in these sheep was well sustained, the class appearing to be one of the most attractive.

Class 116.—Shearling rams numbered sixty-one entries: of these about twenty were selected, and twelve were found worthy of prizes and commendations.

Class 117.—Rams of other ages were represented by twenty entries, and the class contained several animals of high character and considerable merit.

Class 118.—The class of shearling ewes contained sixteen entries. The first-prize pen are a very fine specimen of Shropshire sheep, and many useful animals were exhibited in this class.

We are glad to believe that this class of sheep is generally extending amongst tenant-farmers who require a hardy and rent-paying sheep, and one that is in favour with the public as consumers.

Thomas Horley, Jun.
John Evans.
Thomas Instone.

Cheviots.—The Cheviot sheep exhibited were in few hands. Mr. Elliot's Cheviots, however, made a creditable exhibition themselves. His sheep are well known to be in the front rank. For combination of size with symmetry they have few, if any, equals as a flock. His first-prize shearling ram is a very gay deep-quartered sheep, bred by himself. Mr. Shortreed's second, and the third from Birness, are good, if not top, specimens of the age and breed. The first aged ram from Hindhope is a massive sheep on short legs, with great quarters, proud neck, and aristocratic carriage. The second one stands higher; he is not so truly grown. The third and fourth were fair sheep. Mr. Elliot's first gimmers were much heavier, and had been more liberally fed than Mr. Robson's second ones, which were sweet and well matched. A few remarks by the Judges will be found under the heading of Border Leicesters.

Black-faced, Herdwicks, and Lonks.—Of these breeds there was a moderate show. Indeed, Black-faces were poorly represented; the other breeds were, on the whole, good. The Judges' Report is so full that my remarks are, in a measure, forestalled. It is as follows:—

In the first CLASS—(125)—*Black-faced Mountain Shearling Rams*—we had four entries. Two entries we did not consider eligible to compete, being more like Downs, and certainly not Black-faced Mountains. If they come from a district where there are many of them, being very good mutton sheep, and a fair size for their age, the Council would do well to consider whether they deserve a special class. As we found them to-day, we could not place them.

In CLASS 126—*Black-faced Mountain Rams of any age*—we had five entries. Two again like Downs. The other three were rather a better lot than the shearlings, but we did not consider them as good as the Royal Society should have on their Show-ground. We know there are many better Mountain sheep; and it is a pity their owners were afraid to enter. But these Royal Show honours are often so hard to win, that the competition is short owing to the fear of losing.

CLASS 127.—Only one entry—a fair lot; to which we awarded the first prize.

CLASSES 128, 129, and 130—*Herdwicks.*—In the first class we had six entries, in the second eight entries, and in the last four entries. Nearly the whole of these sheep were in our opinion good; there were some superior sheep. This hardy Mountain sheep has much improved of late years. Instead of, as formerly, seeing sheep nearly all hair, and that not of a good colour, we had to day a good hardy sheep, growing fair good wool, with but little hair, and not much of it dark-coloured. Some we really thought too fine, coming very near the Cheviot wool, and we are afraid that we put one sheep back for that very reason.

CLASSES 131, 132 and 133—*Lonks.*—In the first class there were three entries, in the second two, and in the last three. A very poor competition, to gain right Royal Prizes. They are a very good class of sheep, as one of our colleagues remarked, "The best sheep of the country." We were all unanimous in this (as in the other classes). In the class "Lonk Gimmers," the one gaining the red rosette is fit for any Showyard; and, in our opinion, could compete with the Cheviot; in fact, they are more like the Cheviot than any other class of Mountain sheep. In our opinion, the Society would do well to keep each class of sheep separate.

We are sorry we had not more entries before us in all the classes. We would recommend that more strict rules be made as to shearing, as few (if any) comply with the rule now in force, and we would advise that the horns should not be painted or varnished.

JOHN HAGARTH.
JOHN INGLEBY.
JOHN IRVING.

The Inspectors of Sheep-shearing reported as follows:—

In this, our Report of sheep-shearing at the Liverpool Meeting, we beg to state that the whole of the sheep from the Leicesters, Class 93 to, and including Hampshire, Class 121, were shorn to the full and entire satisfaction of your Inspectors, and, in so far as they were concerned needed no inspection; and it must be a great relief to the Judges to have the sheep shown in their true form, as well as a great satisfaction to the Council that they have so far succeeded in putting down that deception which was practised in former years to so large an extent, and an act of justice to exhibitors that they can now stand on equal ground in the Royal Society's Showyard. We regret, however, to say that from Class 122 to Class 136 we did not find that equality in the shearing of the Hill and Mountain sheep, as we stated on the evening of our inspection. Some of those classes might have almost been disqualified. This class of stock were not so regularly and well shorn. As those sheep are only shown when the Royal Show is conveniently situated for such stock, and are not a regular yearly portion of the Show, we are of opinion that the Council acted wisely to allow them to stand for the prizes the following day. The rules and conditions of sheep-shearing are now so clearly and well laid down to exhibitors, that there is no excuse for such deception being practised (as at one time was prevalent in the Showyard). And it will be well that the Council give expression in strong terms to *all* that these instructions, as to shearing of sheep, shall be strictly attended to. Our attention was drawn to the use of shears in the Showyard in dressing sheep, which we strongly condemn, and a few sheep were disfigured by the extreme use of them.

William Jobson.
J. B. Workman.

Pigs.

In the pig classes there was this year an unusually large number of disqualifications from the state of dentition indicating over age. It is a pity that this should happen. Noblemen and gentlemen who own first-class pigs should endeavour to get their men to pay more attention to the age of the animals, and exercise more scrupulousness when making the entries. In some instances, also, the prizes were withheld for want of merit. There was not, however, much of this to complain of. Generally the pigs, the prize ones at any rate, were big, fat, and well fleshed. The Earl of Ellesmere was the most successful exhibitor. His Lordship's pigs are so well-known to be of the best blood, and to be shown in the best form, that detailed observations are uncalled for. In many districts of the country there is still great room for improvement in the breed of pigs. Gradually, however, the better sorts are making way over the country. The Shows of the Royal and other Societies do much good in this direction.

The large white breed of boars under twelve months old received no tickets. Aged ones were a fair class; Lord Ellesmere's first one being of great size and good quality. Mr. Duckering's second one, "Cultivator," is a ponderous three-year-old boar. The Worsley Hall sows defied competition. His Lordship's first-prize boars of the small white breed are beautiful, plump, very heavily fleshed pigs, with good heads, and not too much "timber;" the first-prize aged boar of this breed was an object of great attraction to porcine fanciers. The class of sows of this breed was one of the best in the department. Mr. Duckering's first-prize sow is a massive shapely animal, carrying a great deal of flesh and fat on moderately sized bone.

Pigs of the small black breed were a middling display. Mr. G. M. Sexton's prize boars and pigs were of a good useful sort, all bred by himself. Lord Ellesmere's first-prize sow of this variety is a compact nice pig of Mr. Sexton's breeding. Mr. Sexton had thus the honour of having bred all the first-prize animals of this breed.

Berkshire pigs were not quite so good as I have seen them; Mr. Stewart's first-prize young boar is a promising specimen, and Mr. Hewer's first-prize aged boar is a well furnished animal, bred by the exhibitor. Mr. Humfrey's second boar, "Windermere," was sold to Mr. Snell for exportation to Canada. Lord Clermont's first and second prize sows of the same breed showed rare quality and good breeding. They won clearly in a large and good class, and were also sold to Mr. Snell.

In the classes of other breeds several huge pigs appeared. The Judges report in these terms:—

Class 140.—In this class there were several disqualifications, and for want of merit no awards were given.

Class 141.—Short entry; prize-animals very good.

Class 142.—Small entry of good animals.

Class 143.—Good class, especially the prize animals.

Class 144.—Disqualification again made a small class.

Class 145.—The first prize in this class was worthy of the highest character. The class generally was commended, showing the esteem of the Judges.

Class 146.—Small class, moderate.

Class 147.—This class was generally commended. Many of the animals were of the highest order of merit.

Class 148.—Only moderate class.

Class 149.—One entry, to which first prize was awarded.

Class 150.—Ditto, ditto.

Class 151.—A very good class. The prize number of great excellence.

Class 152.—Small entry; a bad class.

Class 153.—In this class the prize animals were fair specimens.

Class 154.—One entry, of fair quality.

Class 155.—This was a large class, with only one disqualification. Generally commended, and the Judges would have liked to have added a third prize.

Class 156.—Again many disqualifications destroyed competition. Only the first prize was awarded.

Class 157.—Good class; generally commended.

Class 158.—Two competitors. Second prize withheld.

Class 159.—One of the best classes exhibited, and generally commended.

John Lynn.
John Angus.
John Dale.

Dairy Produce, &c.

Butter.—Of this extensively used article there was a decidedly good display. The dairy produce was altogether a better show than it was last year. It cannot be gainsaid that more encouragement should be given to dairy farmers. The production of cheese and butter is a great and growing industry in this country, and more attention should be paid to it by British farmers. Then it has become apparent that in the manufacture of cheese, the Americans are likely to run this country hard. British tastes are getting more fastidious as to the quality and flavour of cheese. To enable home producers to hold their own, it is evident that greater facilities must be given to farmers in the way of house accommodation, and closer attention to the business is requisite on the part of many of the farmers themselves. The Judges, it will be seen, make some pertinent remarks on this subject.

There was fair competition in the classes for Irish, Welsh, English, and foreign butter. The samples were generally good. The principal contest, however, was for the prizes offered for the best 6 lbs. of fresh butter, of any make. The entries were very numerous, and the quality, flavour, and colour of many of the samples were very superior. The Judges had stiff work in this large and good class. Cheshire had the honour of beating Lancashire, Mr. Butcher's first sample and Mr. Parker's third being from the former county. Lancashire, however, claimed the second ticket, and had the majority of the competitors. With the exception of one from Ireland, all the entries of fresh butter were from England and Wales.

Of Cheshire cheese the display was both large and good. The quality and flavour were above the average in the case of several samples. Lancashire cheese was a smaller show. Any other British make included some very well-made lots of cheese. In the class for foreign cheese there was a very fine display, formed chiefly by the entries of three Liverpool establishments. Mr. Dudleston, Salop, won two of the five first prizes for home-made cheese with very choice makes, which reflect credit on his dairy.

Of hams and bacon there was a very interesting and somewhat novel exhibition. The quality of the several lots was good.

The Judges of Butter report thus:—

We are well pleased with the quality of the Butter shown, more especially Class No. 164, in which, beyond those to which prizes are awarded, highly commended, and commended, are many samples of great merit.

Jas. Watson.
Wm. Clarke.
W. Hudson.

The Judges of Cheese write:—

With few exceptions the cheese is very good in quality, and ripe for so early in the season.

We find that the American cheese is excellent in quality, and far superior to much of the English.

We think it is of great importance that farmers should pay more attention to the making of their cheese, and would suggest that their landlords should assist them by making them better conveniences for keeping their milk. With few honourable exceptions, including Lord Tollemache, of Peckforton Castle, we find most farms deficient in this respect.

If English cheese is to hold its own in our markets, both landlords and tenants must increase their efforts, or our American cousins will take the lead.

Geo. Lewis.
Frank Barratt.

The Judges of Hams and Bacon report as follows:—

Of hams, both in British and foreign, there is only a small quantity offered for competition, considering the value of the prizes. This being so, we cannot recommend the Society to award the Gold Medal.

British Bacon.—There are only two entries we deem worthy of merit, and neither worthy of the first prize—and of course not entitled to the Gold Medal.

Canadian, American, or Foreign Bacon.—This class is well represented, and we have pleasure in awarding the three prizes.

Thos. Harris.
Nicholas Kilvert.

Parade of Liverpool Horses.

Any report of this great exhibition would be incomplete without reference to one of the most interesting features of the Meeting, viz., the parade in the yard of over 300 heavy dray- or cart-horses, from Liverpool, in their holiday attire, on Saturday afternoon. The horses were good animals—some of them very excellent—and all were tastefully decked out for the occasion. Seldom, if ever, have so many really good and very powerful heavy horses been seen together in such order. The largest lots were contributed by the Corporation of Liverpool; by Carver and Co., Jonathan Blundell and Sons, by the North Shore Mill Company, &c. I append the order in which the various teams paraded, as determined by ballot, as well as the number of horses sent by each individual or firm.

Executors of J. M. Threlfall, 6; E. H. Wood and Co., 20; Allan McDougall, 8; Wright, Crossley and Co., 8; Earles and King, 6; Allsopp and Sons, 6; S. Simpson, 4; Thomas Meadows and Co, 4; London and North-Western Railway, 20; Robert Blezard, 6; Alderman Rigby, 3; Bollard and Fletcher, 2; William Harper, 10; Mersey Steel and Iron Company, 12; Macfie and Sons, 6; Thomas Binnie, 10; J. Schweppe and Co., 4; W. Collihole, 2; J. Whitehead and Co., 20; North Shore Mill Company, 30; Thomas Monk, 10; Tyson Brothers, 2; Evan Davies, 2; John Cowx, Jun., 10; Garnock, Bibby and Co., 4; Bryant and Ravenscroft, 2; Liverpool Corporation, 30; Carver and Co., 30; William Gallagher, 2; Midland Railway Company, 16; Jonathan Blundell and Sons, 30; W. Ford Hulton, 5; Executors of H. Hornby, 2.

XXVIII.—*Report on the Exhibition of Implements at Liverpool.* By J. BOWEN JONES, of Ensdon House, Shrewsbury (SENIOR STEWARD).

THE task devolving upon the Senior Steward of Implements this year is comparatively an easy one, for accompanying his brief Report is that of Mr. Hannam, the official Reporter, specially appointed by the Council to enter into a detailed description of the more important implements exhibited.*

The reminiscences of the past Exhibition of the Society at Liverpool are, with one sad exception, of a most agreeable nature. They recall with pleasure—

1st. The co-operation of an efficient and hardworking Local Committee, with an extremely well-selected and energetic Chairman, Mr. Alderman Hubback, whose sole aim was to promote the interests and facilitate the arrangements of the Society.

2nd. An excellent, if somewhat scattered, showground at Newsham Park, within close proximity to the town of Liverpool, and easy of access either by road or rail.

3rd. A warm welcome and generous display of hospitality dispensed to the officials of the Society by the Mayor and other local authorities, as well as a cordial reception from the inhabitants, of the important maritime borough of Liverpool.

4th. A most satisfactory meeting of the Society, whether viewed from its material or financial aspect.

Comparisons are ofttimes deprecated, and are not always altogether trustworthy; still the following summary (p. 577) of present and past entries in the Implement department cannot prove otherwise than satisfactory, more especially when it is borne in mind that the exhibition of duplicates is now prohibited and that of non-agricultural exhibits is discouraged.

The comparison between the Exhibition of Implements in Liverpool this year and that of the third Show of the Society, which was held there in the year 1841 is interesting and surprising: a double row of shedding on the side of a 7-acre field then sufficing for all the requirements of manufacturers; and is it not a fair assumption that the small beginning of the Royal Agricultural Society on that occasion has been, in no inconsiderable degree, instrumental in developing thus rapidly the high state of perfection attained by agricultural machinery, and the concomitant advantages derived therefrom by the tillers of the soil?

The Implement Show at Liverpool marks a period of interest

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* Mr. Hannam's illness has unfortunately necessitated the postponement of the publication of his Report.—EDIT.

PARTICULARS respecting the ENTRIES of MACHINERY exhibited at the ROYAL AGRICULTURAL SOCIETY'S ANNUAL MEETINGS for the last SEVEN YEARS.

Place of Meeting.	Year.	Number of Implements Exhibited.	Ordinary Shedding. Feet.	Machinery in Motion. Feet.	Seeds and Models. Feet.
Wolverhampton	1871	7650	10,612	2114	1263
Cardiff..	1872	5843	9,144	1561	1044
Hull	1873	5634	9,150	1788	793
Bedford	1874	5931	11,402	2585	766
Taunton	1875	4214	8,118	1557	452
Birmingham	1876	6414	11,304	2492	886
Liverpool	1877	6930	12,183	2733	880

to British agriculturists, from the fact of several of its exhibits being developments in new directions for the purpose of diminishing the necessity for manual labour. The exhibition was somewhat generally referred to by spectators as possessing no new features; but it will be seen hereafter, from the Report of Mr. Hannam, that no accusation of dearth of inventive genius can be fairly upheld against the exhibitors of agricultural machinery.

As an illustration of this view several novelties, all or almost all of which have been constructed with a view to their becoming labour-saving machines, may be mentioned; but no special eulogium is intended to be conveyed by their enumeration, finality not having been reached in many instances.

The Judges, Messrs. Kimber, Thompson, and Rowlandson, recommended silver medals to be awarded to Hodgkin, Newhaus, and Co.'s New Patent Boiler Feeder, Catalogue No. 4362; to W. H. Nicholson and Son's New Patent Grist Mill, Catalogue No. 5304; and to Clayton and Shuttleworth's Patent Self-Feeding and Threshing Machine, fitted with Wilder's Patent Combined Guard and Self-Feeder, Catalogue No. 5838, and the Stewards had much pleasure in endorsing their suggestion.

Other novelties were: C. Loader's and Alfred Field and Co.'s Hay Loaders; Turnip-Topping and Tailing-Machine, by Thos. Hunter; Sheaf-Band Cutters attached to threshing-machines, by W. Tasker and Sons, and Marshall, Sons and Co.; Sheep-shearing Machine, by Turquand; and the Sheaf-binders more especially referred to hereafter.

On Wednesday, July 11th, the Society's Exhibition was honoured with a visit from his Imperial Majesty the Emperor of Brazil. His Majesty evinced great interest in the Implement department, and, on leaving, expressed his satisfaction with the inspection.

The death of a visitor to the Show, through the bursting of an emery-grinding and polishing wheel, is the one untoward event of the Meeting that has to be alluded to. Mr. H. M. Jenkins, the Secretary, and Mr. Anderson, the Consulting Engineer of the Society, both attended the inquest, and tendered all the information it was in their power to afford. It is gratifying to find that the Coroner stated upon the occasion that no culpability attached itself either to the management or to the officials of the Society. The annals of the Society record no case of accident for the past eighteen years; but the lamented occurrence at Liverpool is suggestive, and it behoves the Council to seriously consider whether the time has not arrived for the machinery in motion to be better guarded in future.

The trials of automatic sheaf-binders took place on the farm of Mr. Scotson at Aigburth, near Liverpool, on the 16th and 17th of August. The number of entries for competition was reduced by the withdrawal of several machines, and the field was ultimately left in the hands of our enterprising Transatlantic cousins, three of whom contested for the coveted honour of the Society's Gold Medal.

Without entering into details belonging to the province of another, it is sufficient to say that the ordeal these machines were put through was severe; and although the Judges, Messrs. Henry Cantrell and John Coleman, were not sufficiently impressed with the result of the trial to recommend the award of the prize offered, it was obvious to them and to all those who had the opportunity of witnessing the trials, that the elements essential for success existed in each machine, and will doubtless be developed before long. The importance of perfecting such a machine cannot be overrated, and it is to be hoped that the Council will continue its offer of the Gold Medal for the same purpose in connection with the Bristol Meeting.

With respect to these trials the Judges report that, having made a careful and thorough examination of the American Sheaf-binding Machines, which were tried on wheat and oats on Mr. Scotson's farm at Aigburth, they are of opinion that whilst great credit is due to the three inventions, viz., those of Walter A. Wood, D. M. Osborne and Co., and C. H. McCormick, for the considerable efficiency attained, none of them have, as regards the requirements of English farmers, attained that perfection which would justify them in awarding the Gold Medal of the Society. They, however, strongly recommend that a Silver Medal be awarded to Walter A. Wood as a recognition of Progress, and that high commendation be bestowed on the binding mechanism employed by D. M. Osborne and Co.

Believing in the great importance of this invention, when made practically efficient, they were glad to know that the

Society proposed to continue their offer of a Gold Medal for an efficient Self-binder.

The recommendation of the Judges has been adopted by the Stewards.

To Mr. Scotson's co-operation the Stewards were much indebted. The weather during the trials was broken, and the crops scarcely sufficiently ripe for cutting. The land being extremely well-farmed, both the wheat and oats were clean, but the softness of the soil, combined with moisture from the state of the atmosphere on good stand-up crops barely ripe, made the draught of the machines heavier than would usually be the case in practice.

One word in conclusion, to record the sense of obligation the retiring Steward is under for the many courtesies and kindnesses accorded to him by all those with whom he has been officially connected during the past four years, a period that in his case has been productive of many pleasant and profitable hours.

The following returns of the Showyard receipts from the year 1852, may prove interesting to the readers of the 'Journal,' and are therefore appended to this brief Report.

STATEMENT of RECEIPTS and ADMISSIONS of the COUNTRY MEETINGS of the ROYAL AGRICULTURAL SOCIETY of ENGLAND, from 1852 to 1877 inclusive.

LEWES, 1852.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Implement Yard, 2s. 6d.	Wednesday, July 14	835	104 7 6	..
Cattle Yard, 5s.	Wednesday, „ 14	431	107 15 0	..
Implement and Cattle Yards, 2s 6d.	Thursday, „ 15	..	972 7 10	..
Ditto, 1s.	Friday, „ 16			
		..	1184 10 4	170 19 0

TOTAL: Amount received for Admissions, 1184*l.* 10*s.* 4*d.*

GLOUCESTER, 1853.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Implement Yard, 2s. 6d.	Wednesday, July 13	2,571	321 7 0	..
Implement and Cattle Yards, 2s. 6d.	Thursday, „ 14	9,720	1214 19 7	..
Ditto, 1s.	Friday, „ 15	23,915	1195 15 4	..
Ditto, 1s.	Saturday „ 16	39	1 19 0	..
		36,245	2734 0 11	377 7 6

TOTAL: Number of Persons, 36,245.
Amount received for Admissions, 2734*l.* 0*s.* 11*d.*

LINCOLN, 1854.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Trial Yard, 10s.	Thursday, July 13	9	4 10 0	..
	Friday, „ 14	11	5 10 0	..
	Saturday, „ 15	20	10 0 0	..
	Monday, „ 17	20	10 0 0	..
	Tuesday, „ 18	21	10 10 0	..
Implement Yard, 2s. 6d.	Wednesday, „ 19	2,201	278 8 2	..
Cattle Yard, 10s. ..	Wednesday, „ 19	752	376 0 0	..
Implement and Cattle Yard, 2s. 6d.	Thursday, „ 20	12,501	1566 4 8	..
Ditto, 1s.	Friday, „ 21	22,100	1109 16 7	..
		37,635	3370 19 5	420 0 6

TOTAL: Number of Persons, 37,635.
Amount received for Admissions, 3370*l.* 19*s.* 5*d.*

CARLISLE, 1855.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Trial Yard, 5s.	Thursday, July 19	..	88 15 0	..
	Friday, „ 20			
	Saturday, „ 21			
	Monday, „ 23			
	Tuesday, „ 24			
Implement Yard, 2s. 6d.	Wednesday, „ 25	..	2190 5 10	..
Cattle Yard, 10s... ..	Wednesday, „ 25			
Implement and Cattle Yards, 2s. 6d.	Thursday, „ 26			
Ditto, 1s.	Friday, „ 27	..	982 18 8	..
		..	3261 19 6	425 6 1

TOTAL: Amount received for Admissions, 3261*l.* 19*s.* 6*d.*

CHELMSFORD, 1856.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Implement Yard, 2s. 6d.	Tuesday, July 15	947	117 13 6	..
Ditto, 2s. 6d. ..	Wednesday, „ 16	2,357	294 10 0	..
Cattle Yard, 5s.	Wednesday, „ 16	1,215	303 15 0	..
Implement and Cattle Yards, 2s. 6d.	Thursday, „ 17	28,463	2272 9 11	..
Ditto, 1s.	Friday, „ 18			
		32,982	2988 8 5	334 13 0

TOTAL: Number of Persons, 32,982.
Amount received for Admissions, 2988*l.* 8*s.* 5*d.*

SALISBURY, 1857.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Implement Yard, 2*s.* 6*d.*	Tuesday, July 21	969	121 5 6	..
Ditto, 2*s.* 6*d.* ..	Wednesday, „ 22	2,623	327 6 2	..
Cattle Yard, 5*s.*	Wednesday, „ 22	1,319	329 18 2	..
Implement and Cattle Yards, 2*s.* 6*d.*	Thursday, „ 23	14,004	1748 7 3	..
Ditto, 1*s.*	Friday, „ 24	18,427	920 18 8	..
		37,342	3447 15 9	324 17 0

TOTAL: Number of Persons, 37,342.
Amount received for Admissions, 3447*l.* 15*s.* 9*d.*

CHESTER, 1858.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Trial Yard, 5*s.*	Thursday, July 15	53	13 5 0	..
	Friday, „ 16	144	36 0 0	..
	Saturday, „ 17	270	31 10 0	..
	Monday, „ 19	238	59 9 8	..
Implement Yard, 2*s.* 6*d.*	Tuesday, „ 20	1,251	156 5 6	36 13 0
Ditto, 2*s.* 6*d.* ..	Wednesday, „ 21	4,887	610 9 10	152 12 0
Cattle Yard, 5*s.*	Wednesday, „ 21	3,180	794 16 0	..
Implement and Cattle Yards, 2*s.* 6*d.*	Thursday, „ 22	24,790	3101 3 6	262 1 6
Ditto, 1*s.*	Friday, „ 23	27,726	1387 4 6	71 6 8
		62,539	6190 4 0	522 13 2

TOTAL: Number of Persons, 62,539.
Amount received for Admissions, 6190*l.* 4*s.* 0*d.*

WARWICK, 1859.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.	Received for Catalogues.
			£ s. d.	£ s. d.
Implement Yard, 2*s.* 6*d.*	Tuesday, July 12	1,689	210 17 6	36 1 0
Ditto, 2*s.* 6*d.* ..	Wednesday, „ 13	5,154	644 4 2	144 12 0
Cattle Yard, 5*s.*	Wednesday, „ 13	3,386	844 18 6	..
Implement and Cattle Yards, 2*s.* 6*d.*	Thursday, „ 14	19,902	2487 17 6	274 8 0
Ditto, 1*s.*	Friday, „ 15	25,446	1274 0 3	49 5 2
		55,577	5461 17 11	504 6 2

TOTAL: Number of Persons, 55,577.
Amount received for Admissions, 5461*l.* 17*s.* 11*d.*

CANTERBURY, 1860.

Prices of Admission.	Days of Admission.	Persons.	Amount Received.			Received for Catalogues.		
			£	s.	d.	£	s.	d.
Trial Yard, 5s.	Wednesday, July 4	19	4	15	0	..		
	Thursday, „ 5	52	13	0	0	..		
	Friday, „ 6	49	12	5	6	..		
	Saturday, „ 7	41	10	5	0	..		
Implement Yard, 2s. 6d.	Monday, .. 9	813	101	13	0	56	1	0
Cattle Yard, 5s.	Monday, „ 9	459	114	15	0	..		
Implement and Cattle Yards, 2s. 6d.	Tuesday, „ 10	5,866	732	18	3	115	[illegible]	[illegible]
Ditto, 1s.	Wednesday, „ 11	20,881	1048	10	8	70	4	0
Ditto, 1s.	Thursday, „ 12	14,124	706	5	10	31	14	0
		42,304	2739	7	10	273	12	0

TOTAL: Number of Persons, 42,304.
Amount received for Admissions, 2739*l*. 7*s*. 10*d*.

LEEDS, 1861.

Prices of Admission.	Days of Admission.	Persons	Amount Received.			Received for Catalogues.		
			£	s.	d.	£	s.	d.
Implement and Cattle Yards, 5s.	Monday, July 15	2,027	505	19	0	116	5	0
Ditto, ..	Tuesday, „ 16	10;287	1285	8	4	235	1	0
Ditto, [illegible] ..	Wednesday, „ 17	18,823	2351	4	2	229	4	0
Ditto, 1s.	Thursday, „ 18	73,824	3695	9	3	81	9	0
Ditto, 1s.	Friday, „ 19	40,777	2051	15	5	18	19	0
		145,738	9889	16	2	680	18	0

TOTAL: Number of Persons, 145,738.
Amount received for Admissions, 9889*l*. 16*s*. 2*d*.

BATTERSEA, 1862.

Prices of Admission.	Days of Admission.	Persons	Amount Received.			Received for Catalogues.		
			£	s.	d.	£	s.	d.
Implement Yard, 2s. 6d.	Monday, June 23	363	46	0	0	20	1	0
Ditto, 2s. 6d. ..	Tuesday, „ 24	806	102	5	2	20	2	0
Ditto, 2s. 6d. .. Cattle Yard, 17s. 6d. ..	Wednesday, „ 25	1,146	697	15	5	148	18	0
Implement and Cattle Yards, 5s.	Thursday, „ 26	5,873	1467	1	7	178	7	0
Ditto, 2s. 6d. ..	Friday, „ 27	10,056	1261	0	3	182	0	0
Ditto, 2s. 6d. ..	Saturday, „ 28	8,644	1082	4	2	120	1	0
Ditto, 1s.	Monday, „ 30	28,092	1404	15	6	175	9	0
Ditto, 1s.	Tuesday, July 1	38,131	1911	6	8	192	8	0
Ditto, 1s.	Wednesday, „ 2	31,217	1566	15	7	87	2	3
		124,328	9539	4	4	1124	8	3

TOTAL: Number of Persons, 124,328.
Amount received for Admissions, 9539*l*. 4*s*. 4*d*.

WORCESTER, 1863.

Prices of Admission	Days of Admission.	Persons.	Amount Received			Received for Catalogues		
			£	s	d	£	s	d
Trial Yard, 5s.	Wednesday, July 15	63	15	15	0	..		
	Thursday, „ 16	97	24	5	0	..		
	Friday, „ 17	60	15	0	0	..		
	Saturday, „ 18	49	12	5	0	..		
[illegible] and Cattle . ..	Monday, „ 20	811	404	19	6	96	9	0
[illegible]	Tuesday, „ 21	7,683	960	12	1	162	12	0
[illegible]	Wednesday, „ 22	9,293	1162	2	0	104	7	0
[illegible]	[illegible]ursday, „ 23	38,282	1915	18	5	107	7	0
Di[illegible]	[illegible] „ 24	19,469	974	13	9	28	13	0
[illegible]		75,807	5485	10	9	499	8	0

Total [illegible] Persons, [illegible]5,807.
A[illegible] for Ad[illegible], 5485*l* 10*s* 9*d*

[illegible]WCASTLE, [illegible]

Prices of Admission	Days of Admission.	Persons.	[illegible]			Received for [illegible]logues		
Trial [illegible]	[illegible]rd, [illegible]6	[illegible]	[illegible]			[illegible]		
	[illegible]d [illegible]	731	3[illegible]	[illegible]	0	95	[illegible]	[illegible]
	[illegible]	[illegible]24	1279	1[illegible]	[illegible]	[illegible]		
	[illegible]	[illegible]	1995	13	4	[illegible]		
	[illegible]	[illegible]	2846	16	11	[illegible]		
	Friday [illegible]	[illegible]11	[illegible]42	6	1	5[illegible]		
		[illegible]	[illegible]	[illegible]	7	724	9	6

Total Number of Persons, 114,6[illegible]
Amount received for Admiss[illegible]

PLYMOUTH, 1865.

[illegible] of Admission	Days of Admission	Persons	A[illegible] Rece[illegible]			[illegible]		
			£	s.	d	[illegible]		
[illegible], 5s	Saturday, July 15	25	6	5	0	2	[illegible]	[illegible]
[illegible] and Cattle	Monday, „ 17	1,063	265	16	0	5[illegible]	6	[illegible]
[illegible], [illegible]. 6d. .	Tuesday, „ 18	4,767	595	11	10	89	14	0
[illegible] 6d. ..	Wednesday, „ 19	17,269	2159	0	0	112	6	6
[illegible] .. .	Thursday, „ 20	42,943	2147	14	10	58	16	6
Ditto, [illegible]	Friday, „ 21	21,969	1099	12	7	20	4	0
		88,036	6274	0	3	342	18	0

Total: Number of Persons, 88,036.
Amount received for Admissions, 6274*l* 0*s* 3*d*

BURY ST. EDMUNDS, 1867.

Prices of Admission.	Days of Admission.	Persons.	Amount Received. £ s. d.	Received for Catalogues. £ s. d.
Trial Yard, Yard, 5s. ..	Wednesday, July 10	87	9 5 0	..
	Thursday, „ 11	87	21 15 0	..
	Friday, „ 12	105	26 8 0	..
	Saturday, „ 13	38	10 0 0	[illegible]
Implement and Cattle Yards, 5s.	Monday, „ 15	910	227 15 0	[illegible]
Ditto, 2s. 6d. ..	Tuesday, „ 16	4,465	[illegible]	[illegible]
Ditto, 2s. 6d. ..	Wednesday, „ 17	7,88[illegible]	[illegible]	[illegible]
Ditto, 1s.	Thursday, „ 18	33,[illegible]	[illegible]	[illegible]
Ditto, 1s.	Friday, „ 19	[illegible]	[illegible]	[illegible]

TOTAL : Number of [illegible]
Amount [illegible]

[illegible]

Prices [illegible]	[illegible]	Persons.	Amount Received. £ s. d.	Received for Catalogues. £ s. d
Trial Yard, [illegible]	Wednesday, July 15	102	25 10 0	[illegible]
Implement and Cattle [illegible]	Thursday, [illegible] 16	[illegible]	[illegible]	[illegible]
Ditto, 2s. 6[illegible] ..	Friday, [illegible] 17	[illegible]	[illegible]	[illegible]
[illegible] 6d. ..	Saturday, [illegible] 18	[illegible]	[illegible]	[illegible]
[illegible], 1s.	Monday, [illegible] 20	[illegible]	[illegible]	[illegible]
Ditto, 1s.	Tuesday, [illegible]	[illegible]	1227 18 [illegible]	[illegible]
		97,1[illegible]	6756 15 5	508 19 0

TOTAL : Number of [illegible]
[illegible] Admissions, 6771*l.* 0*s.* 5*d.*

[illegible]ESTER, 1869.

[illegible]	Days of Admission	Persons.	Amount Received. £ s. d.	[illegible]
[illegible] Yard, [illegible]	Friday, July 16 Saturday, „ 17	1,588	198 9 [illegible]	[illegible]
Implement and Cattle [illegible], 5s.	Monday, „ 19	2,348	586 3 [illegible]	[illegible]
Ditto, 5s. . ..	Tuesday, „ 20	12,960	3,242 14 3	[illegible]
Ditto, 2s. 6d. ..	Wednesday, „ 21	39,405	4,953 1 1	29[illegible]
Ditto, 1s.	Thursday, „ 22	57,129	2,868 7 11	207 2[illegible]
Ditto, 1s.	Friday, „ 23	39,285	1,966 7 2	79 6[illegible]
Ditto, 1s.	Saturday, „ 24	36,392	1,817 0 5	109 7[illegible]
Ditto, 10s. 6d. ..	Season tickets from the 19th to 24th	..	1,432 2 0	..
		189,102	17,059 5 10	1055 [illegible]

TOTAL ; Number of Persons, 189,102.
Amount received for Admissions, 17,059*l.* 5*s.* 10*d.*

OXFORD, 1870.

Prices of Admission.	Days of Admission	Persons	Amount Received.			Received for Catalogues.		
			£	s.	d.	£	s.	d.
Trial Yard, 5s. .. .	Monday, July 11 to Saturday, „ 16	625	157	0	0	47	12	0
[illegible] and Cattle [illegible], 5s.	Monday, „ 18	1,809	451	15	0	133	12	5
[illegible], 2s. 6d. ..	Tuesday, „ 19	8,409	1052	2	4	145	5	1
[illegible] 6d. ..	Wednesday. „ 20	9,207	1151	9	3	92	12	4
[illegible] ..	Thursday, „ 21	33,580	1684	17	2	56	14	4
[illegible]	Friday, „ 22	18,423	923	15	7	27	2	0
[illegible]	[illegible] & day tickets	..	601	11	0		..	
		72,053	6022	10	4	502	18	2

[illegible] 2,053.
[illegible]ions, 6022*l.* 10*s.* 4*d.*

[illegible]N, 1871.

Prices of Admission	[illegible]	[illegible]	Amount Received.			Received for Catalogues		
			[illegible]	[illegible]	d.	£	s.	d
Trial Yard, 5s.	Saturday, [illegible]	[illegible]	[illegible]				..	
Implement and Cattle Yards, 5s.	Monday, „ [illegible]	[illegible]	[illegible]			[illegible]		0
Ditto, 2s. 6d. ..	Tuesday, „ 11	7[illegible]	[illegible]			[illegible]		
Ditto, 2s. 6d. ..	Wednesday, „ 12	11,[illegible]	114[illegible]	[illegible]		[illegible]		0
Ditto, 1s. .. .	Thursday. „ 13	52,466	[illegible]	2	[illegible]	[illegible]		
Ditto, 1s.	Friday, „ 14	33,624	[illegible]	[illegible]	[illegible]	[illegible]		
Ditto, 10s. 6d. ..	Season & day tickets	..	102	[illegible]	[illegible]	[illegible]		
		107,519	7431	10	4	[illegible]		

TOTAL: Number of Persons, 107,519.
Amount received for Admissions, 7431*l.* 10*s.* 4*d.*

CARDIFF, 1872.

Prices of Admission	Days of Admission.	Persons.	Amount Received.			Received for Catalogues		
			£	s.	d.	£	s.	d.
Implement Yard, 2s. 6d	Monday, July 8 to Saturday, „ 13	1,144	143	4	6		..	
Implement and Cattle Yards, 5s.	Monday „ 15	1,809	452	5	0	100	0	0
Ditto, 2s. 6d. ..	Tuesday, „ 16	8,901	1112	18	11	110	0	0
Ditto, 2s 6d. ..	Wednesday „ 17	12,124	1516	1	7	[illegible]	0	0
Ditto, 1s.	Thursday, „ 18	38,918	1950	14	10	65	0	0
Ditto, 1s.	Friday, „ 19	22,289	1116	1	2	65	11	0
Ditto, 10s. 6d. ..	Season & day tickets	..	790	15	0		..	
		85,185	7082	1	0	444	11	0
Horse ring	.. ..	..	256	6	2		..	

TOTAL: Number of Persons, 85,185.
Amount received for Admissions, 7082*l.* 1*s.* 0*d.*

HULL, 1873.

Prices of Admission	Days of Admission	Persons	Amount Received. £	s.	d.	Received for Catalogues £	s.	d.
Implement Yard, 2*s* 6*d*	Saturday, July 12	124	15	7	6	[illegible]		
Implement and Cattle Yards, 5*s*.	Monday, „ 14	1,963	488	[illegible]		[illegible]		
Ditto, 2*s* 6*d*. .	Tuesday, „ 15	7,240	9[illegible]			[illegible]		
Ditto, 2*s* 6*d*... ..	Wednesday, „ 16	15,614	1[illegible]			[illegible]		
Ditto, 1*s*.	Thursday, „ 17	50,3[illegible]	2[illegible]			[illegible]		
Ditto, 1*s* .	Friday „ 18	2[illegible]	[illegible]			[illegible]		
Ditto, 10*s* 6*d* .	Season & day tickets	[illegible]	[illegible]			[illegible]		
		[illegible]	[illegible]			[illegible]		
Horse ring	..	[illegible]	[illegible]			[illegible]		

TOTAL. Numb[illegible]
Am[illegible]

BED[illegible]

Prices of Admission	Days of Admission	Persons	Amount Received £	s	d	Received for Catalogues £	s.	d
[illegible]	[illegible]ay, [illegible]		13	5	0	7	18	0
[illegible]	[illegible]	[illegible],581	645	9	3	135	0	0
[illegible]	Tue[illegible]	7,534	941	17	9	123	11	0
[illegible]	W[illegible] 15	9,585	1200	6	8	94	7	0
[illegible]	[illegible] „ 16	35,127	1758	6	10	58	16	2
[illegible]	[illegible] „ 17	17,056	848	10	6	25	19	4
[illegible] 10*s*. [illegible]	[illegible] & day tickets	..	173	1	0	..		
		71,989	5580	17	0	445	11	6
[illegible] . .	.. ..	..	138	18	6	..		

[illegible]AL: Number of Persons, 71,989
Amount received for Admissions, 5580*l* 17*s* 0*d*.

TAUNTON, 1875

Prices of Admission	Days of Admission	Persons.	Amount Received £	s	d.	Received for Catalogues. £	s	d.
Implement Yard, 2*s* 6*d*	Saturday, July 10	130	16	2	6	7	10	0
Implement and Cattle Yards, 5*s*	Monday, „ 12	831	207	14	0	77	0	0
Ditto, 2*s* 6*d*. ..	Tuesday, „ 13	9,193	1028	8	7	120	0	0
Ditto, 2*s* 6*d*. ..	Wednesday, „ 14	5,715	680	14	4	46	0	0
Ditto, 1*s*	Thursday, „ 15	25,483	1131	0	6	39	15	0
Ditto, 1*s*	Friday, „ 16	6,416	284	2	6	9	15	6
Ditto, 10*s* 6*d*. ..	Season & day tickets	..	577	7	6	..		
		47,768	3925	9	11	300	0	6
Horse ring	.. ..	..	88	9	0	..		

TOTAL: Number of Persons, 47,768.
Amount received for Admissions, 3925*l*. 9*s*. 11*d*.

BIRMINGHAM, 1876.

Prices of Admission	Days of Admission	Persons	Amount Received.			Received for Catalogues.		
			£	s.	d.	£	s.	d
Implement Yard, 5s ..	Monday, July 17	79	19	15	0			
Ditto, 5s ..	Tuesday, „ 18	189	47	5	0			
Implement and Cattle Yards, 5s. . ..	Wednesday, „ 19	6,891	1,313	13	1	232	0	0
Ditto, 2s. 6d. ..	Thursday, „ 20	18,889	2,318	18	0	233	17	7
Ditto, 2s 6d ..	Friday, „ 21	17,414	2,154	14	8	147	13	6
Ditto, 1s	Saturday, „ 22	58,384	2,884	6	4	79	10	0
Ditto, 1s ..	Monday, „ 24	61,567	3,065	18	4	69	17	0
[illegible]	Season & day tickets	..	680	11	8			
		163,413	12,485	2	1	762	18	1
[illegible]		..	295	2	6	..		

TOTAL [illegible]
Amount received for Admissions, [illegible] 2s. 1d.

LIVERPOOL, 1877.

Prices of Admission	Days of Admission.	Persons	Amount Received.			Received for Catalogues.		
			£	s.	d.	[illegible]		
Implement Yard, 5s.	Monday, July 9	114	28	10	0	[illegible]		
Ditto, 5s. . ..	Tuesday, „ 10	264	65	10	0	[illegible]		
Implement and Cattle Yards, 5s.	Wednesday, „ 11	6,673	1,667	6	[illegible]	[illegible]		
Ditto, 2s 6d .	Thursday, „ 12	25,074	3,056	13	[illegible]	[illegible]		
Ditto, 2s 6d. ..	Friday, „ 13	22,481	2,795	1[illegible]	[illegible]	[illegible]		
Ditto, 1s	Saturday, „ 14	51,313	2,543	1[illegible]	[illegible]	106	[illegible]	
Ditto, 1s .	Monday, „ 16	31,93[illegible]	1,578	5	1	[illegible]	10	[illegible]
Ditto, 10s 6d ..	Season and day tickets	..	1,231	17	6			
		138,354	12,967	18	11	1073	7	[illegible]
Horse ring	.. ..	..	429	11	0	..		

TOTAL Number of Persons, 138,354
Amounts received for Admissions, 12,967*l.* 18*s.* 11*d.*

Royal Agricultural Society of England.

1877.

President.

LORD SKELMERSDALE.

Trustees.

Year when Elected.	
1855	ACLAND, Sir THOMAS DYKE, Bart., M.P., *Sprydoncote, Exeter, Devonshire.*
1857	BRIDPORT, Viscount, *Cricket St. Thomas, Chard, Somersetshire.*
1850	CHESHAM, Lord, *Latimer, Chesham, Bucks.*
1861	DENT, J. D., *Ribston Hall, Wetherby, Yorkshire.*
1863	KINGSCOTE, Colonel, M.P., *Kingscote, Wootton-under-Edge, Gloucestershire.*
1868	LICHFIELD, Earl of, *Shugborough, Staffordshire.*
1854	MACDONALD, Sir ARCHIBALD KEPPEL, Bt., *Woolmer Lodge, Liphook, Hants.*
1860	MARLBOROUGH, Duke of, K.G., *Blenheim Park, Oxford.*
1846	MILWARD, RICHARD, *Thurgarton Priory, Southwell, Notts.*
1839	PORTMAN, Viscount, *Bryanston, Blandford, Dorset.*
1856	POWIS, Earl of, *Powis Castle, Welshpool, Montgomeryshire.*
1858	RUTLAND, Duke of, K.G., *Belvoir Castle, Grantham, Leicestershire.*

Vice-Presidents.

1873	BEDFORD, Duke of, *Woburn Abbey, Bedfordshire.*
1861	CATHCART, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
1839	CHICHESTER, Earl of, *Stanmer Park, Lewes, Sussex.*
1867	DEVONSHIRE, Duke of, K.G., *Holker Hall, Lancashire.*
1847	EVERSLEY, Viscount, *Heckfield Place, Winchfield, Hants.*
1848	GIBBS, B. T. BRANDRETH, *Halfmoon Street, Piccadilly, London,* W.
1858	KERRISON, Sir EDWARD C., Bart., *Brome Hall, Scole, Suffolk.*
1839	MILES, Sir WILLIAM, Bart., *Leigh Court, Bristol, Somersetshire.*
1852	RICHMOND AND GORDON, Duke of, K.G., *Goodwood, Chichester, Sussex.*
1859	VERNON, Lord, *Sudbury Hall, Derby.*
1861	WELLS, WILLIAM, *Holmewood, Peterborough, Northamptonshire.*
1855	WYNN, Sir WATKIN WILLIAMS, Bart., M.P., *Wynnstay, Ruabon, Denbighshire.*

Other Members of Council.

1858	AMOS, CHARLES EDWARDS, 5, *Cedars Road, Clapham Common, Surrey.*
1877	ARKWRIGHT, J. H., *Hampton Court, Leominster, Herefordshire.*
1875	*AVELING, THOMAS, *Rochester, Kent.*
1875	*AYLMER, HUGH, *West Dereham, Stoke Ferry, Norfolk.*
1868	BOOTH, THOMAS CHRISTOPHER, *Warlaby, Northallerton, Yorkshire.*
1863	BOWLY, EDWARD, *Siddington House, Cirencester, Gloucestershire.*
1861	*CANTRELL, CHARLES S., *Riding Court, Datchet, Bucks.*
1866	DAVIES, DAVID REYNOLDS, *Agden Hall, Lymm, Cheshire.*
1860	DRUCE, JOSEPH, *Eynsham, Oxford.*
1868	EDMONDS, WILLIAM JOHN, *Southrop, Lechlade, Gloucestershire.*
1871	EGERTON, Hon. WILBRAHAM, M.P., *Rostherne Manor, Knutsford, Cheshire.*
1867	*ESLINGTON, Lord, M.P., *Ravensworth Castle, Durham.*
1873	*EVANS, JOHN, *Uffington, Shrewsbury, Salop.*
1876	*FEVERSHAM, Earl of, *Duncombe Park, Helmsley, Yorkshire.*
1875	FRANKISH, WILLIAM, *Limber Magna, Ulceby, Lincolnshire.*

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* Those Members of Council whose names are prefixed by an asterisk retire in July, but are eligible for re-election in May next.

Year when Elected	
1874	Hemsley, John, *Shelton, Newark, Notts.*
1873	Horley, Thomas, Jun., *The Fosse, Leamington, Warwickshire.*
1866	Hornsby, Richard, *Spittle Gate, Grantham, Lincolnshire.*
1876	*Howard, Charles, *Biddenham, Bedford.*
1871	*Jones, J. Bowen, *Ensdon House, Shrewsbury, Salop.*
1848	Lawes, John Bennet, *Rothamsted, St. Albans, Herts.*
1869	*Leeds, Robert, *Keswick Old Hall, Norwich.*
1872	Leicester, Earl of, K.G., *Holkham Hall, Wells, Norfolk.*
1874	Lindsay, Colonel Loyd, M.P., *Lockinge Park, Wantage, Berkshire.*
1865	*Lopes, Sir Massey, Bart., M.P., *Maristow, Roborough, Devon.*
1871	*McIntosh, David, *Havering Park, Romford, Essex.*
1874	*Martin, Joseph, *Highfield House, Littleport, Isle of Ely, Cambridgeshire.*
1871	Masfen, R. Hanbury, *Pendeford, Wolverhampton, Staffordshire.*
1875	Musgrave, Sir R. C., Bart., *Edenhall, Penrith, Cumberland.*
1857	*Pain, Thomas, *The Grove, Basingstoke, Hants.*
1874	*Pole-Gell, H. Chandos, *Hopton Hall, Wirksworth, Derbyshire.*
1861	Randell, Charles, *Chadbury, Evesham, Worcestershire.*
1875	*Ransome, Robert Charles, *Ipswich, Suffolk.*
1871	Rawlence, James, *Bulbridge, Wilton, Salisbury, Wilts.*
1869	*Ridley, M. White, M.P., *Blagdon, Cramlington, Northumberland.*
1861	*Rigden, William, *Hove, Brighton, Sussex.*
1875	*Russell, Robert, *Farningham, Dartford.*
1874	Sanday, George Henry, *Wensley House, Bedale, Yorkshire.*
1856	Shuttleworth, Joseph, *Hartsholme Hall, Lincoln.*
1872	*Skelmersdale, Lord, *Lathom Hall, Ormskirk, Lancashire.*
1874	*Spencer, Earl, K.G., *Althorpe, Northampton.*
1875	Stratton, Richard, *The Duffryn, Newport, Monmouthshire.*
1873	*Torr, John, M.P., *Carlett Park, Eastham, Chester.*
1874	Turbervill, Major Picton, *Ewenny Priory, Bridgend, South Wales.*
1845	*Turner, George, *Great Bowley, Tiverton, Devonshire.*
1871	*Turner, Jabez, *Haddon, Yaxley, Huntingdonshire.*
1871	*Wakefield, William H., *Sedgwick, Kendal, Westmoreland.*
1870	Welby-Gregory, Sir William Earle, Bart., M.P., *Denton Hall, Grantham, Lincolnshire.*
1870	Whitehead, Charles, *Barming House, Maidstone, Kent.*
1865	*Wilson, Jacob, *Woodhorn Manor, Morpeth, Northumberland.*

Secretary and Editor.

H. M. JENKINS, 12, *Hanover Square, London,* W.

Consulting Chemist—Dr. Augustus Voelcker, F.R.S., 11, *Salisbury Square,* E.C.

Consulting Botanist—W. Carruthers, F.R.S., F.L.S., *British Museum,* W.C.

Consulting Veterinary Surgeon—James Beart Simonds, *Royal Veterinary College, Camden Town,* N.W.

Officers of the Brown Institution, Wandsworth Road, S.W.—Dr. J. Burdon Sanderson, F.R.S., *Professor Superintendent;* W. Duguid, *Veterinary Inspector.*

Consulting Engineers—Eastons & Anderson, *The Grove, Southwark Street,* S.E.

Surveyor—George Hunt, *Evesham, Worcestershire.*

Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.

Publisher—John Murray, 50, *Albemarle Street,* W.

Bankers—The London and Westminster Bank, *St. James's Square Branch,* S.W.

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* The Members of Council whose names are prefixed by an asterisk retire in July, but are eligible for re-election in May next.

STANDING COMMITTEES FOR 1877.

Finance Committee.

Kingscote, Colonel (Chairman).
Bridport, Viscount.
Booth, T. C.
Randell, Charles.
Shuttleworth, J.

House Committee.

The President.
Chairman of Finance Committee.
Bridport, Viscount.
Cantrell, C. S.
Gibbs, B. T. Brandreth.

Journal Committee.

Dent, J. D. (Chairman).
Cathcart, Earl.
Spencer, Earl.
Vernon, Lord.
Welby-Gregory, Sir W. E., Bt.
Hemsley, J.
Jones, J. Bowen.
Kingscote, Colonel.
Milward, Richard.
Ransome, R. C
Ridley, M. White.
Turbervill, Major.
Wells, W.
Whitehead, Charles.

Chemical Committee.

Wells, William (Chairman).
Bedford, Duke of.
Lichfield, Earl of.
Vernon, Lord.
Welby-Gregory, Sir W. E., Bt.
Aveling, T.
Dent, J. D.
Edmonds, W. J.
Jones, J. Bowen.
Lawes, J. B.
Voelcker, Dr. A.
Wakefield, W. H.
Whitehead, Charles.
Wilson, Jacob.

Botanical Committee.

Whitehead, Charles (Chairman).
Vernon, Lord.
Edmonds, W. J.
Frankish, W.
Gibbs, B. T. Brandreth.
Hemsley, J.
Jones, J. Bowen.
Russell, R.
Turbervill, Major.
Turner, Jabez
Voelcker, Dr.
Wells, W.

Veterinary Committee.

Egerton, Hon. Wilbraham (Chairman)
Cathcart, Earl.
Bridport, Viscount.
Booth, T. C.
Brown, Professor.
Carpenter, Dr.
Duguid, W.
Gibbs, B. T. Brandreth.
Harpley, M. J.
Kingscote, Colonel.
Lindsay, Colonel Loyd.
Milward, R.
Pole-Gell, H. Chandos.
Quain, Dr.
Ridley, M. White.
Sanday, G. H.
Sanderson, Dr. J. Burdon.
Simonds, Professor.
Wakefield, W. H.
Wells, William.
Wilson, Jacob.

Stock-Prizes Committee.

Milward, Richard (Chairman).
Bridport, Viscount.
Musgrave, Sir R. C.
Aylmer, H.
Booth, T. C.
Bowly, Edward.
Evans, John.
Gibbs, B. T. Brandreth.
Hemsley, J.
Horley, Thomas.
Leeds, Robert.
McIntosh, D.
Martin, J.
Masfen, R. H.
Pain, T.
Pole-Gell, H. Chandos.
Ridley, M. White.
Rigden, William.
Sanday, G. H.
Stratton, R.
Torr, J.
Turner, George.
Wakefield, W. H.
Wilson, Jacob.
The Stewards of Live Stock.

Implement Committee.

Hemsley, J. (Chairman).
Bridport, Viscount.
Macdonald, Sir A. K.
Amos, C. E.
Aveling, T.
Booth, T. C.
Cantrell, Chas. S.
Edmonds, W. J.
Evans, John.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Jones, J. Bowen.
Leeds, Robert.
Martin, J.
Masfen, R. H.
Milward, R.
Ransome, R. C.
Sanday, G. H.
Shuttleworth, Joseph.
Turbervill, Major.
Turner, Jabez.
Whitehead, Charles.
Wilson, Jacob.
The Stewards of Implements.

General Liverpool Committee.

Chesham, Lord (Chairman).
Bedford, Duke of.
Devonshire, Duke of.
Cathcart, Earl.
Bridport, Viscount.
Eslington, Lord.
Feversham, Lord.
Skelmersdale, Lord.
Vernon, Lord.
Musgrave, Sir R. C., Bt.
Wynn, Sir Watkin W., Bart.
Aveling, T.
Aylmer, H.
Booth, T. C.
Bowly, Edward.
Cantrell, Charles S.
Earle, Arthur.
Egerton, Hon. W.
Fletcher, Alfred.
Frankish, W.
Gibbs, B. T. Brandreth.
Hemsley, J.
Horley, T., Jun.
Hornsby, Richard.
Hubback, Joseph.
Jones, J. Bowen.
Leeds, Robert.
Liverpool, Mayor of.
Martin, J.
Masfen, R. H.
Milward, Richard.
Pole-Gell, H. Chandos.
Randell, Charles.
Ransome, R. C.
Ridley, M. W.
Rigby, Thomas.
Sanday, G. H.
Shuttleworth, J.
Stratton, R.
Torr, J.
Turner, Jabez.
Wakefield, W. H.
Whitehead, Charles.
Wilson, Jacob.
Wyatt, Halifax.

Show-Yard Contracts Committee.

Wilson, Jacob (Chairman).
Bridport, Viscount.
Vernon, Lord.
Amos, C. E.
Aveling, T.
Booth, T. C.
Frankish, W.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Milward, Richard.
Shuttleworth, Joseph.
Stratton, R.

Committee of Selection.

Milward, R. (Chairman).
Cathcart, Earl.
Bridport, Viscount.
Egerton, Hon. W.
Booth, T. C.
Wilson, Jacob.

And the Chairmen of the Standing Committees.

Education Committee.

Bedford, Duke of (Chairman).
Dent, J. D.
Howard, Charles.
Jones, J. Bowen.
Kingscote, Colonel.
McIntosh, David.
Turbervill, Major P.
Voelcker, Dr.
Wells, William.
Whitehead, Charles.

Cattle Plague Committee.

The whole Council.

⁂ The President, Trustees, and Vice-Presidents are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, HANOVER SQUARE, THURSDAY, DECEMBER 7TH, 1876.

REPORT OF THE COUNCIL.

DURING the year 1876 the number of Governors and Members of the Society has been increased by the election of 4 Governors and 464 Members, and diminished by the death of 6 Governors and 185 Members, as well as by the resignation of 144 Members, and the removal of 24 names from the list by order of the Council.

The Society now consists of :—

82 Life Governors,
77 Annual Governors,
2191 Life Members,
4149 Annual Members,
11 Honorary Members,

making a total of 6510, showing an increase of 109 Members since this time last year.

Since the last General Meeting in May the Council have lost, by the death of Mr. C. BARNETT, of Stratton Park, Biggleswade, Beds., the services of an old and valued colleague. The vacancy thus caused has been filled up by the election of Mr. CHARLES HOWARD, of Biddenham, Bedford.

The half-yearly statement of accounts to the 30th June, 1876, has been examined and approved by the Society's Auditors and Accountants, and has been published for the information of the Members in the last number of the 'Journal.' The funded capital has since then been increased by the investment of 4000*l.* in New Three per Cents.—chiefly the surplus receipts of the Birmingham Meeting. The funded property of the Society is now 22,334*l.* 0*s.* 5*d.* New Three per Cents., and the balance in the hands of the bankers, on the 1st instant, was 1023*l.* 8*s.* 1*d.*

Implement Committee.

Hemsley, J. (Chairman).
Bridport, Viscount.
Macdonald, Sir A. K.
Amos, C. E.
Aveling, T.
Booth, T. C.
Cantrell, Chas. S.
Edmonds, W. J.
Evans, John.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Jones, J. Bowen.
Leeds, Robert.
Martin, J.
Masfen, R. H.
Milward, R.
Ransome, R. C.
Sanday, G. H.
Shuttleworth, Joseph.
Turbervill, Major.
Turner, Jabez.
Whitehead, Charles.
Wilson, Jacob.
The Stewards of Implements.

General Liverpool Committee.

Chesham, Lord (Chairman).
Bedford, Duke of.
Devonshire, Duke of.
Cathcart, Earl.
Bridport, Viscount.
Eslington, Lord.
Feversham, Lord.
Skelmersdale, Lord.
Vernon, Lord.
Musgrave, Sir R. C., Bt.
Wynn, Sir Watkin W., Bart.
Aveling, T.
Aylmer, H.
Booth, T. C.
Bowly, Edward.
Cantrell, Charles S.
Earle, Arthur.
Egerton, Hon. W.
Fletcher, Alfred.
Frankish, W.
Gibbs, B. T. Brandreth.
Hemsley, J.
Horley, T., Jun.
Hornsby, Richard.
Hubback, Joseph.
Jones, J. Bowen.
Leeds, Robert.
Liverpool, Mayor of.
Martin, J.
Masfen, R. H.
Milward, Richard.
Pole-Gell, H. Chandos.
Randell, Charles.
Ransome, R. C.
Ridley, M. W.
Rigby, Thomas.
Sanday, G. H.
Shuttleworth, J.
Stratton, R.
Torr, J.
Turner, Jabez.
Wakefield, W. H.
Whitehead, Charles.
Wilson, Jacob.
Wyatt, Halifax.

Show-Yard Contracts Committee.

Wilson, Jacob (Chairman).
Bridport, Viscount.
Vernon, Lord.
Amos, C. E.
Aveling, T.
Booth, T. C.
Frankish, W.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Milward, Richard.
Shuttleworth, Joseph.
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Committee of Selection.

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Wells, William.
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Royal Agricultural Society of England.

GENERAL MEETING,

12, HANOVER SQUARE, THURSDAY, DECEMBER 7TH, 1876.

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The Birmingham Meeting was one of the most successful which the Society has ever held, alike in the number and excellence of the entries of Live Stock and Implements, in the attendance of the public, and in the result to the Society's finances. The Local Committee were most liberal in providing the necessary accommodation for so large a Meeting, to the success of which they had also greatly contributed by the offer of numerous and handsome prizes, in addition to those usually offered for competition. The alteration made this year in making Wednesday the opening day of the Show, in place of Monday, caused the shilling days to fall on Saturday and Monday, which are to a great extent holidays in large towns. This fact, aided by fine weather, and a remarkably attractive show, obtained the attendance of more than 120,000 people on those two days—a number which has never before been equalled at any of the Society's Country Meetings.

The trials of Reaping-Machines were held at harvest-time on the Earl of Warwick's sewage-farm, at Leamington, and excited great interest among the competitors and the farmers in the neighbourhood. A preliminary Report on these trials, written by Mr. Jabez Turner, the Senior Steward, has already been published in the last number of the 'Journal;' and the usual descriptive and illustrated Report will be published in the forthcoming number of the 'Journal' next spring.

The competition for the substantial prizes offered by the Birmingham Local Committee for the best-managed farms in the County of Warwick was, as has been already announced to the Society, restricted to five entries in the large-farm class, while the class for smaller farms did not attract a single entry. The results of this competition have been admirably described in the Report by Mr. H. J. Little, one of the Judges, which is published in the last number of the 'Journal.'

The arrangements for the Country Meeting, to be held next year at Newsham Park, Liverpool, have recently occupied the attention of the Council; and they are glad to announce that the Local Committee are endeavouring to promote the success of the Meeting in the most liberal manner, by the offer of additional Prizes for Hunters, Ponies, and Cart-horses; families of Shorthorns and of Herefords; for Welsh, Longhorn, Ayrshire, and Galloway Cattle; for Border Leicester, Cheviot, Black-faced, Herdwick, Lonk, and Carnarvon Sheep; for dairy-produce, and well-managed farms, as well as by the provision of all requisite accommodation. The total amount of Prizes offered by the Local Committee is over 2400*l.*, and by the Society over 3600*l.*, making a total of upwards of 6000*l.*

The Prizes for Farms have been divided into three sections, namely:—Arable Farms, Dairy or Stock Farms (the area for these sections including the counties of Lancaster, Chester, Denbigh, and Flint), and farms in the Isle of Man. These sections have been sub-divided into eight classes, and forty-five entries have been received in seven of them, as follows:—

Class.		Entries.
1.	Arable Farm over 150 acres	10
2.	Ditto between 80 and 150 acres	4
3.	Ditto between 40 and 80 acres	4
4.	Dairy or Stock Farm, not less than 200 acres ..	8
5.	Ditto between 100 and 200 acres	12
6.	Ditto between 50 and 100 acres ..	4
7.	Isle of Man Farm, 70 acres or upwards	2
8.	Ditto between 25 and 70 acres ..	1
	Total	45

No Prizes for special classes of Implements will be offered for competition in connection with the Liverpool Meeting; but ten Silver Medals will be offered for New Inventions, and the Gold Medal of the Society will be again offered for an efficient Sheaf-binder, whether attached to a reaping-machine or otherwise.

The Council have added the following clause to the existing rule in the Implement Prize-sheet relating to protests:—"Every protest against an Implement, on the ground of an infringement of Patent-right, shall be accompanied by a deposit of 25*l.*, which shall be returned in the event of the protest or action at law being decided in favour of the person lodging the protest; but otherwise the said sum of 25*l.* shall be forfeited to the Society."

The Council have altered the rule relating to the Pedigree of Shorthorns, so as to read as follows:—"Every animal entered in the Shorthorn Classes must be certified by the Exhibitor to be entered, or to be eligible to be entered, in Coates's Herd-Book."

The Council have resolved that the experiment of opening the Exhibition on Wednesday, which was so successful at Birmingham this year, shall be repeated next year at Liverpool; and they have therefore decided that the Show shall commence on Wednesday, July 11th. Another experiment tried at Birmingham was the provision of a Members' Club. The necessity of using a building constructed for a different purpose, and the extent to which the accommodation provided was used, rendered that accommodation insufficient; but the Council were convinced that a better organized and more complete arrangement would be an acquisition to those Members of the Society who attend the Country Meetings. They are therefore taking steps to provide a permanent building for the use of the Members under such regulations as may be deemed necessary.

Since the last Meeting of the Members of the Society, the Chemical Committee presented to the Council the "Suggestions for Valuers," drawn up by Mr. Lawes and Dr. Voelcker, in accordance with their recommendation in April. The question of the publication of those "Suggestions" having been brought forward at the November Meeting of the Council, it was decided, after some discussion, that it was not desirable to publish them.

The Council have sanctioned a scheme of experiments, drawn up by Mr. Lawes and Dr. Voelcker, to be carried out on the Duke of Bedford's farm at Woburn, which, as previously reported, his Grace has generously placed at the disposal of the Council for experimental purposes.

Experiments on foot-and-mouth disease were commenced in June by Dr. Burdon Sanderson, and have been continued in successive series up to the present time. The modes of infection employed have been of the most varied kinds, but the results as yet have been negative. The investigations of pleuro-pneumonia have been continued simultaneously, with reference, first, to the modes by which the disease is supposed to be communicable; and secondly, to its pathological results.

The Council have much pleasure in stating that the progress of these experiments is watched with great interest, not only by the agricultural public, but also by the medical profession. The Yorkshire Agricultural Society have voted the sum of 100*l.*, and the Norfolk Agricultural Association the sum of ten guineas, towards defraying the cost of these investigations; and the British Medical Association have granted 50*l.* for a special microscopic investigation of the diseased organs in pleuro-pneumonia.

The Council regret to state that they have received a communication from the Secretary of State for Foreign Affairs, announcing that the President of Peru had summoned a Congress to meet on the 15th of June, to obtain from it an authorization to raise the duties on nitrate of soda to so high a price as will, it is apprehended, have the effect of destroying all private enterprise, and of converting the production of that article into a Government monopoly. An arrangement was to be made with the Peruvian banks, by which they will have the whole management of the trade for ten years, and the production of nitrate of soda was to be limited to 100,000 tons, although 350,000 tons have been raised already in one year. Considering the increasing importance of nitrate of soda to British agriculture, and the effect of its price upon that of artificial manures, a letter was written by the President of the Society to the Secretary of State for Foreign Affairs, deprecating the proposed interference with the private trade in nitrate of soda, and pointing out the injurious effects it cannot fail to have upon the interests of the agriculture of this country.

The Council have expressed to the President of the Board of Trade their opinion that the use of steam-power should be allowed on tramways in agricultural districts under such regulations and provisions as the Board of Trade may deem necessary.

A joint deputation from the Committee of the Agricultural Engineers' Association and from the Council of the Society have had an interview with a Committee of the Goods Managers of the principal Railways, with a view to obtain more favourable regulations in reference to the conveyance of Live Stock and Implements to and from the Society's Shows.

The Council have been informed by M. Drouyn de Lhuys, President of the "Société des Agriculteurs de France," that an Agricultural Congress will be held in Paris in the year 1878; and that the French Society are desirous that the Council should obtain a Memoir on British Agriculture to be laid before the Congress. The Council have accepted the invitation of the "Société des Agriculteurs de France," and have arranged for the preparation of the proposed Memoir under the supervision of the 'Journal' Committee.

The Council have considered by what means the standard of education of Veterinary Surgeons could be maintained, and, if possible, increased. With this view they appointed a deputation to wait upon the Lord President of the Privy Council to request that no power be given to any Body to grant diplomas in Veterinary Science, which would tend to lower the standard at present maintained by the Royal College of Veterinary Surgeons. They have also decided to offer annually the following prizes for proficiency in the pathology, causes, symptoms, and treatment (preventive and curative) of diseases affecting cattle, sheep, and pigs, to Graduates of the Royal College of Veterinary Surgeons, who have been educated at the Royal Veterinary College, or at any other Veterinary College in England that may hereafter be affiliated with the Royal College of Veterinary Surgeons:—

FIRST PRIZE	Gold Medal and 20*l.*
SECOND PRIZE	Silver Medal and 10*l.*
THIRD PRIZE	Bronze Medal and 5*l.*

The Council of the Royal College of Veterinary Surgeons have undertaken to make the necessary arrangements for the examinations, subject to certain regulations which have been agreed upon, immediately after the ordinary December examination of the Royal College of Veterinary Surgeons; and all Graduates of the Royal College of Veterinary Surgeons, of not less than three, and not more than fifteen months' standing, will be eligible, provided they have passed with very great credit, or with great credit. The first examination will be held next month.

Thirty-two candidates from five schools were entered to compete for the ten Junior Scholarships, value 20*l.* each, offered annually to pupils of Middle-Class Schools. The result of the examination is that seven Scholarships have been gained, subject to the fulfilment of the usual conditions during the ensuing year, namely, four by pupils of the Surrey County School, two by pupils of the Bedford County School, and one by a pupil of the Albert College, Glasnevin.

By order of the Council,
H. M. JENKINS,
Secretary.

MEMORANDA.

ADDRESS OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, May 22, 1877, at 12 o'clock.

MEETING at Liverpool, July 11, 1877, and four following days (Sunday excepted).

GENERAL MEETING in London, December, 1877.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October open only to Members of Council and Governors of the Society.

ADJOURNMENTS.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

OFFICE HOURS.—10 to 4. On Saturdays, 10 to 2.

DISEASES of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society, and of sending animals to the Brown Institution, Wandsworth Road, S.W.—(A statement of these privileges will be found on page xxxiii.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in this Appendix (p. xxxiv).

BOTANICAL PRIVILEGES —The Botanical Privileges enjoyed by Members of the Society will be found stated in this Appendix (page xxxvi).

SUBSCRIPTIONS —1. Annual —The subscription of a Governor is £5, and that of a Member £1, due in advance on the 1st of January of each year, and becoming in arrear if unpaid by the 1st of June. 2 For Life —Governors may compound for their subscription for future years by paying at once the sum of £50, and Members by paying £10. Governors and Members who have paid their annual subscription for 20 years or upwards, and whose subscriptions are not in arrear, may compound for future annual subscriptions, that of the current year inclusive, by a single payment of £25 for a Governor, and £5 for a Member.

PAYMENTS —Subscriptions may be paid to the Secretary, in the most direct and satisfactory manner, either at the Office of the Society, No. 12, Hanover Square, London, W., or by means of post-office orders, to be obtained at any of the principal post offices throughout the kingdom, and made payable to him at the Vere Street Office, London, W ; but any cheque on a banker's or any other house of business in London will be equally available, if made payable on demand. In obtaining post-office orders care should be taken to give the postmaster the correct initials and surname of the Secretary of the Society (H. M Jenkins), otherwise the payment will be refused to him at the post-office on which such order has been obtained; and when remitting the money-orders it should be stated by whom, and on whose account, they are sent. Cheques should be made payable as drafts on demand (not as bills only payable after sight or a certain number of days after date), and should be drawn on a London (not on a local country) banker. When payment is made to the London and Westminster Bank, St. James's Square Branch, as the bankers of the Society, it will be desirable that the Secretary should be advised by letter of such payment, in order that the entry in the banker's book may be at once identified, and the amount posted to the credit of the proper party. No coin can be remitted by post, unless the letter be registered.

NEW MEMBERS —Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary. Forms of Proposal may be obtained on application to the Secretary.

⁂ Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-laws, of a Statement of the General Objects, &c., of the Society, of Chemical, Botanical, and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Royal Agricultural Society of England.

1877.

DISTRIBUTION OF MEMBERS OF THE SOCIETY AND OF MEMBERS OF COUNCIL.

DISTRICTS.	COUNTIES.	NUMBER OF MEMBERS.	NUMBER IN COUNCIL.	MEMBERS OF COUNCIL.
A.	BEDFORDSHIRE	68	2	Duke of Bedford, V.P., C. Howard.
	BUCKINGHAMSHIRE	72	2	Lord Chesham, T.; C. S. Cantrell.
	CAMBRIDGESHIRE	87	1	J. Martin.
	ESSEX	126	1	D. McIntosh.
	HERTFORDSHIRE	115	1	J. B. Lawes.
	HUNTINGDONSHIRE	46	2	Jabez Turner; W. Wells, V.P.
	MIDDLESEX	279	1	B. T. Brandreth Gibbs, V.P.
	NORFOLK	230	3	Earl of Leicester; Robert Leeds; Hugh Aylmer.
	OXFORDSHIRE	141	2	Duke of Marlborough, T.; J. Druce.
	SUFFOLK	146	1	Sir E. C. Kerrison, V.P.
		1310	16	
B.	CUMBERLAND	101	1	Sir R. C. Musgrave.
	DURHAM	105	1	Lord Eslington.
	NORTHUMBERLAND	144	2	M. White Ridley; Jacob Wilson.
	WESTMORELAND	69	1	W. H. Wakefield.
		419	5	
C.	DERBYSHIRE	114	2	Lord Vernon, V.P.; H. Chandos Pole-Gell.
	LEICESTERSHIRE	114	1	Duke of Rutland, T.
	LINCOLNSHIRE	218	3	W. Frankish; Sir W. Earle Welby-Gregory, J. Shuttleworth.
	NORTHAMPTONSHIRE	115	1	Earl Spencer.
	NOTTINGHAMSHIRE	139	2	R. Milward, T.; J. Hemsley.
	RUTLAND	18		
		718	9	

DISTRIBUTION OF MEMBERS OF THE SOCIETY—*continued.*

Districts.	Counties.	Number of Members.	Number in Council.	Members of Council.
D.	Berkshire	126	1	Colonel Loyd Lindsay.
	Cornwall	45		
	Devonshire	119	3	Sir T. D. Acland, T.; Sir M. Lopes; G. Turner.
	Dorsetshire	60	1	Lord Portman, T.
	Hampshire	136	3	Viscount Eversley, V.P.; Sir A. K Macdonald, T.; T. Pain.
	Kent	290	2	C. Whitehead, R. Russell.
	Somersetshire	140	2	Viscount Bridport, T.; Sir W. Miles, V.P.
	Surrey	120	1	C. E. Amos.
	Sussex	137	3	Earl of Chichester, V.P.; Duke of Richmond and Gordon, V.P., W. Rigden.
	Wiltshire	104	1	J. Rawlence.
		—— 1277	— 17	
E.	Yorkshire	348	5	Earl Cathcart V.P.; Earl of Feversham; T. C. Booth; J. D. Dent, T., G. H. Sanday.
F.	Gloucestershire	207	3	E. Bowly; W. J. Edmonds; Col. Kingscote, T.
	Herefordshire	91	1	J. H. Arkwright.
	Monmouthshire	55	1	R. Stratton.
	Shropshire	373	2	John Evans; J. Bowen Jones.
	Staffordshire	313	2	Earl of Lichfield, T.; R. H. Masfen.
	Warwickshire	218	1	T. Horley, jun.
	Worcestershire	148	1	C. Randell.
	South Wales	141	1	Major Picton Turbervill.
		—— 1546	— 12	
G.	Cheshire	166	3	D. R. Davies; Hon. W. Egerton; John Torr.
	Lancashire	245	2	Duke of Devonshire, V.P.; Lord Skelmersdale.
	North Wales	166	2	Earl of Powis, T.; Sir W. W. Wynn, V.P.
		—— 577	— 7	
				Implement Makers.
				T. Aveling.
				R. Hornsby.
				R. C. Ransome.
Scotland		69		
Ireland		84		
Channel Islands		10		
Foreign Countries		86		
Members without addresses		76		
		—— 325		

ROYAL AGRICULTURAL

DR.

HALF-YEARLY CASH ACCOUNT

	£. s. d.	£ s. d.	£ s. d.
To Balance in hand, 1st July, 1876:—			
Bankers	1,929 16 8		
Secretary	34 7 9	1,964 4 5	
At Deposit		2,000 0 0	3,964 4 5
To Income —			
Subscriptions:—			
Governors' Annual	25 0 0		
Members' Life-Compositions	519 0 0		
Members' Annual	885 2 0	1,429 2 0	
Dividends on Stock		268 5 9	
Interest on Deposit		27 13 4	
Journal:—			
Sales	96 2 7		
Advertisements	117 2 11	213 5 6	
Chemical:—			
Sale of Evidence		3 15 0	
Veterinary:—			
Donation from the Norfolk Agricultural Society		10 10 0	
Establishment:—			
Rent		100 0 0	
Farm Inspection:—			
Birmingham Local Committee (Prizes)	175 0 0		
Entry Fees for 1877	58 0 0	233 0 0	
Taunton Meeting		47 1 6	
Total Income		.. .. .	2,332 13 1
To Country Meetings:—			
Birmingham		15,791 6 5	
Liverpool		7 14 6	15,799 0 11
			£22,095 18 5

BALANCE-SHEET,

LIABILITIES

	£ s. d.	£ s. d.	£ s. d.
To Capital:—			
Surplus, 30th June, 1876		22,641 13 4	
Less Surplus of Expenditure over Income during the Half-year, viz:—			
Expenditure	3,113 5 11		
Income	2,332 13 1		
	780 12 10		
Less half-year's interest and depreciation on Country Meeting Plant	186 2 0	966 14 10	21,674 18 6
To Birmingham Meeting —			
Excess of Receipts over Expenditure		.. .. ..	3,845 15 2
			£25,520 13 8

QUILTER, BALL, & CO., *Accountants.*

SOCIETY OF ENGLAND.

FROM 31ST JULY TO 31ST DECEMBER, 1876. CR.

	£ s. d.	£ s. d.	£ s. d.
By Expenditure:—			
Establishment:—			
Salaries, Wages, &c.	592 10 0		
House:—Rent, Taxes, Repairs, &c.	498 10 2		
Office:—Printing, Postage, Stationery, &c	167 12 2		
		1,258 12 4	
Journal.—			
Printing and Stitching	439 7 6		
Postage and Delivery	140 0 0		
Literary Contributions	172 8 6		
Woodcuts	25 8 6		
Map	20 0 0		
Advertising	12 15 0		
		809 19 6	
Chemical —			
Consulting Chemist's Salary	150 0 0		
Printing Notes of Evidence taken by Committee	124 19 2		
		274 19 2	
Botanical —			
Consulting Botanist's Salary		50 0 0	
Education.—			
Printing	6 2 6		
Scholarships	200 0 0		
		206 2 6	
Farm Inspection —			
Prizes	175 0 0		
Judges	137 14 5		
Printing	9 19 6		
		322 13 11	
Sundries —			
Law Costs	120 18 6		
Preparing Specifications and Tenders for Show-yard Works	50 0 0		
		170 18 6	
Taunton Meeting		20 0 0	
Total Expenditure			3,113 5 11
By Capital Account.—			
Country Meeting Plant			359 9 11
By Country Meetings:—			
Birmingham		14,182 1 1	
Liverpool		85 17 10	
			14,267 18 11
By Stock:—			
Purchase of £4221 12*s* 9*d* New 3 per Cents			4,000 0 0
By Balance in hand, 31st December —			
Bankers		327 7 1	
Secretary		27 16 7	
			355 3 8
			£22,095 18 5

31ST DECEMBER, 1876.

ASSETS.	£ s d.	£ s. d.
By Cash in hand	355 3 8	
By New 3 per Cent Stock 22,334*l* 0*s*. 5*d* cost*	21,340 7 1	
By Books and Furniture in Society's House	1,451 17 6	
By Country Meeting Plant	2,295 2 1	
		25,442 10 4
By Liverpool Meeting (Balance)		78 3 4
		£25,520 13 8

* *Value at 94¾ = £21,161 9s 8d.*

Mem.—The above Assets are exclusive of the amount recoverable in respect of arrears of Subscription to 31st Dec., 1876, which at that date amounted to 815*l*.

Examined, audited, and found correct, this 19th day of February, 1877.

FRANCIS SHERBORN,
A H. JOHNSON,
HENRY CANTRELL.
Auditors on behalf of the Society.

ROYAL AGRICULTURAL

DR. YEARLY CASH ACCOUNT,

	£. s. d.	£. s. d.	£ s. d.
To Balance in hand, 1st Jan. 1876.—			
Bankers	. .	179 9 9	
Secretary	. .	49 5 4	
			228 15 1
To Income —			
Subscriptions —			
Governors' Life-Compositions	20 0 0		
Governors' Annual	370 0 0		
Members' Life-Compositions	1,082 0 0		
Members' Annual	4,280 19 0		
		5,752 19 0	
Dividends on Stock	. .	537 14 2	
Interest on Deposit Account	. .	27 13 4	
Journal:—			
Sales	179 7 10		
Advertisements	117 2 11		
		296 10 9	
Chemical.—			
Sale of Evidence	. .	3 15 0	
Veterinary:—			
Donation from the Glamorganshire Agricultural Society	10 0 0		
Ditto from the Norfolk Agricultural Society	10 10 0		
		20 10 0	
Establishment.—			
Rent	. .	300 0 0	
Farm-Inspection:—			
Birmingham Local Committee (Prizes)	175 0 0		
Entry Fees for 1877	58 0 0		
		233 0 0	
Sundries:—			
Sale of Specifications for Show-Yard Works	. .	7 10 0	
Total Income	. .	. .	7,179 12 3
To Country Meetings:—			
Taunton	. .	98 1 6	
Birmingham	. .	21,959 6 7	
Liverpool	. .	7 14 6	
			22,065 2 7
			£29,473 9 11

SOCIETY OF ENGLAND.

FROM 1ST JANUARY TO 31ST DECEMBER, 1876. CR.

	£. s. d.	£. s. d.	£. s. d.
By Expenditure :—			
Establishment :—			
Salaries, Wages, &c.	1,159 10 0		
House: Rent, Taxes, Repairs, &c.	839 1 1		
Office: Printing, Postage, &c	482 15 11	2,481 7 0	
Journal :—			
Printing and Stitching	1,018 19 0		
Postage and Delivery	307 6 6		
Literary Contributions	311 16 6		
Wood Engravings	31 6 6		
Lithographing	11 11 0		
Advertising	22 4 6		
Map	20 0 0	1,723 4 0	
Chemical :—			
Consulting Chemist's Salary	300 0 0		
Grant for Investigations	200 0 0		
Taking notes of Evidence before Chemical Committee	50 4 0		
Printing ditto	185 4 8		
Postage, &c., of ditto to Members	62 14 8	798 3 4	
Veterinary :—			
Grant to Royal Veterinary College, 1 year	100 0 0		
Grant for Investigations	250 0 0	350 0 0	
Botanical :—			
Consulting Botanist's Salary	. .	100 0 0	
Education :—			
Scholarships	200 0 0		
Prizes	40 0 0		
Fees to Examiners	52 10 0		
Advertising and Printing	52 17 0	345 7 0	
Sundries :—			
Law Costs	120 18 6		
Expenses of Inspection Committee	16 19 10		
Mounting in case Vote of Thanks to Mr Gibbs	43 7 6		
Printing Specifications and Advertising for Tenders for Show-Yard Works	51 12 6		
Preparing Specifications and Tenders for Show-Yard Works	50 0 0	282 18 4	
Farm Inspection :—			
Prizes	175 0 0		
Judges	137 14 5		
Printing for 1877	9 19 6	322 13 11	
Potato Disease Investigations	. .	50 0 0	
Subscriptions (paid in error) returned	. .	13 0 0	
Total Expenditure	. .	.	6,466 13 7
By Capital Account :—			
Country Meeting Plant	. .	. .	440 2 11
By Country Meetings :—			
Taunton	. .	100 0 0	
Birmingham	. .	18,025 11 11	
Liverpool	. .	85 17 10	18,211 9 9
By Stock :—			
Purchase of 4221*l.* 12*s.* 9*d.* New 3 per Cents	. .	. .	4,000 0 0
By Balance in hand, 31st Dec :—			
Bankers	. .	327 7 1	
Secretary	. .	27 16 7	355 3 8
			£29,473 9 11

COUNTRY MEETING

Receipts.

	£.	s.	d.
Subscription from Birmingham	2,000	0	0
Admissions to Show-Yard by Payment	11,804	10	5
Admissions by Tickets Season, 352*l.* 2*s.* 6*d* ; other Tickets, 315*l* 9*s.* 2*d.*	667	11	8
Admissions to Grand Stand	295	2	6
Sale of Catalogues	842	0	7
Entries in Implement Catalogue	450	0	0
Implement Exhibitors' Payments for Shedding	265	0	0
Non-Members' Fees for entry of Implements	2,801	13	0
Fees for entry of Live Stock	626	5	0
Fees for Horse Boxes and Stalls	298	0	0
Premiums for Supply of Refreshments	582	16	0
Premium for Manure	15	0	0
Premium for Cloak Rooms and Lavatories	60	0	0
Fines for Non-Exhibition of Live Stock	60	0	0
Reference Number Fines	19	7	6
	£20,787	6	8

ACCOUNT, BIRMINGHAM, 1876.

Expenditure.

	£.	*s.*	*d.*	£.	*s.*	*d.*
Show-Yard Works —viz. Carriage, Storage, Erecting and Painting, taking to pieces, Packing and Insurance of Permanent Buildings, and other Plant	611	19	6			
Implement Sheds, 1594*l*. 11*s* 6*d* ; Seed and Model Sheds, 210*l* 8*s*. 6*d*.	1805	0	0			
Stock Sheds, 920*l* ; Horse Boxes, 1264*l* 18*s* ; Wool, Cheese, Butter Shed, 51*l*. 10*s* 10*d* ; Fodder Shed, 103*l* 6*s*	2339	14	10			
Fencing and Gates, 524*l*. 11*s*. ; Horse and Cattle Rings, 93*l*. 14*s*.	618	5	0			
Hurdles, 149*l* 2*s*. 6*d* ; Signs and Notice Boards, 149*l* 8*s*	298	10	6			
Members' Club and Tent, 46*l*. 6*s*. 6*d*., Lavatories, Closets, &c, 257*l* 11*s*. 6*d*.	303	18	0			
Grand Stand, 380*l* ; other Offices, 31*l* 12*s*. 2*d* ; Awnings, 95*l* 9*s*.	507	1	2			
Platform, Entrances, &c, 183*l*. 17*s* 6*d*.; other Works, 261*l*. 12*s*.	445	9	6			
Surveyor, 212*l*. 18*s* 6*d* ; Depreciation of Plant, 358*l* 2*s* 7*d*	571	1	1			
				7,500	19	7
Judges Implements, 116*l*. 14*s* 8*d* ; Stock, 268*l*. 9*s*. 8*d* ; Cheese and Butter, 12*l* 2*s* 6*d*				397	6	10
Consulting Engineers and Assistants				244	19	4
Inspectors Veterinary, 60*l* 6*d* ; Shearing, 21*l*. 9*s* 6*d*				81	10	0
Police. Metropolitan, 430*l* 13*s* 10*d* ; County, 37*l* 14*s*				468	7	10
Clerks and Assistants, 103*l* 13*s* ; Expenses of Secretary and official Staff, 29*l*. 8*s*. 4*d*.				133	1	4
Assistant Stewards Implements, 31*l* 10*s*.; Stock, 23*l* 12*s*.				55	2	0
Foremen Trials, 19*l* 15*s* 10*d* ; Implements, 18*l* 8*s* 6*d* ; Horses, 10*l* 17*s* ; Cattle, 11*l* 10*s* ; Sheep and Pigs, 10*l* 10*s* ; Fodder, 13*l* 6*s* ; Yardmen, 22*l* 1*s* 3*d*.				106	8	7
Yardmen, Labourers, Grooms, &c, 242*l* 3*s* 10*d* ; Labourers, Waggoners, and Watchmen at Trials, 39*l* 5*s*				281	8	10
Index Clerk and Money Takers, 95*l* 4*s*. 6*d*, Money-changer, Doorkeepers, &c. 91*l* 16*s*. 11*d*.				187	1	5
Stewards' Expenses				241	0	2
Lodgings for Stewards, Judges, and other Officials				205	6	0
Refreshments for ditto				248	2	7
Catalogues Implements, 358*l*. 5*s* ; Stock, 169*l* 9*s* ; Awards, 57*l* 7*s* ; Plan of Yard, 25*l* ; Sellers, 57*l* 3*s*, Carriage and Packing, 26*l* 8*s*				693	12	0
Printing, 736*l* 19*s* 9*d* ; Advertising and Bill Posting, 513*l*. 19*s* 6*d*				1250	19	3
Hay, 224*l* 16*s* 3*d*, Straw, 407*l*. 2*s* 9*d* ; Green Food, 507*l*. 7*s*. 6*d* ; Mangolds, 21*l* 8*s* 3*d* Insurance and Surveyor, 6*l* 8*s* 6*d*				1167	3	3
Postage, Carriage, Stationery, Badges, &c				117	4	9
Repairs, Insurance, and Carriage of Testing Machinery				82	13	5
Horse Hire, 30*l*. 4*s* 6*d* ; Carriages, Cabs, &c, 163*l* 7*s* 6*d*, Horses at Trials, 21*l*. 10*s* 6*d*.				215	2	6
Trials Opening out Plots, 26*l*. 5*s* ; Surveyors, 23*l*. 6*d* ; Timber, &c, 6*l*. 19*s*. 10*d* ; Gratuity to Farm Bailiff, 10*l* 10*s* ; Sundries, 10*l*. 15*s*. 4*d*.				77	10	
Land and Damage to Crops at Trials				214	10	0
Fire Brigade, 8*l*. 14*s* ; Watermen, 2*l* 15*s*				11	9	0
Medicines, 1*l* 18*s*. 6*d* ; Corn, 3*l* 15*s* 8*d*.; Rope and Tar Cord, Candles, Oil, Disinfectants, and Hire of Forks, Shovels, Halters, Scythes, Hammers, &c, 4*l*. 16*s*.				10	10	2
Hire of Furniture and Harmonium				8	15	0
Journeys to Birmingham previous to Show				11	5	0
Gratuities to Post-Office Officials, 10*l* 10*s*.; Petty Payments, 11*l*. 3*s* 9*d*				21	13	9
Rosettes, 15*l* 13*s* 6*d* ; Medals, 24*l*, 7*s*				40	0	6
Prizes: Stock, 3160*l*.;* Implements, 130*l*.				3,290	0	0
				£17,363	3	9
Balance				3,424	2	11
				£20,787	6	8

* Exclusive of Local Prizes, 1207*l*.

Liverpool Meeting, 1877.

ON WEDNESDAY, THE 11TH OF JULY, AND FOUR FOLLOWING DAYS (SUNDAY EXCEPTED).

SCHEDULE OF PRIZES.

I.—LIVE-STOCK PRIZES.

Prizes offered by the Liverpool Local Committee are marked thus *.

Reference Number in Certificates.	**HORSES.**	First Prize.	Second Prize	Third Prize
Class	STALLIONS.	£.	£.	£.
1	Agricultural Stallion, foaled before 1st Jan. 1875, *not qualified to compete as Clydesdale or Suffolk*	50	20	10
2	Agricultural Stallion, foaled in the year 1875, *not qualified to compete as Clydesdale or Suffolk* ..	50	20	10
3	Yearling Agricultural Stallion, *not qualified to compete as Clydesdale or Suffolk*	15*	10*	5
4	Clydesdale Stallion, foaled before the 1st Jan. 1875	50	20	10
5	Clydesdale Stallion, foaled in the year 1875 ..	50	20	10
6	Yearling Clydesdale Stallion	15*	10*	5*
7	Suffolk Stallion, foaled before the 1st of Jan. 1875	50	20	10
8	Suffolk Stallion, foaled in the year 1875	50	20	10
9	Thorough-bred Stallion, suitable for getting Hunters	100	25	10
10	Stallion, suitable for getting Hackneys, not less than 14 hands 2 inches and not exceeding 15 hands 2 inches	25	15	5
11	Pony Stallion, not less than 13 hands 2 inches and under 14 hands 2 inches	25	15	5
12	Pony Stallion, under 13 hands 2 inches high ..	15*	10*	5*
	CHAMPION PRIZE, of 100 Guineas, for the best Agricultural or Cart Stallion in the Show-Yard, in Classes 1 to 8. Given by the Mayor of Liverpool.			
	BROOD MARES AND AGRICULTURAL FILLIES.			
13	Agricultural Mare and foal, *not qualified to compete as Clydesdale or Suffolk*	30	20	10
14	Clydesdale Mare and foal	30	20	10
15	Suffolk Mare and foal	30	20	10
16	Agricultural or Cart Mare, not exceeding 16 hands, with a Foal	15*	10*	5*
17	Agricultural Filly, three years old, *not qualified to compete as Clydesdale or Suffolk*	20	10	5

Reference Number in Certificates.	HORSES—*continued.*	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
18	Clydesdale Filly, three years old	20	10	5
19	Suffolk Filly, three years old	20	10	5
20	Agricultural Filly, two years old, *not qualified to compete as Clydesdale or Suffolk*	20	10	5
21	Clydesdale Filly, two years old	20	10	5
22	Suffolk Filly, two years old	20	10	5
23	Mare and Foal, suitable for breeding Hunters	30	20	10
24	Mare and Foal, suitable for breeding Hackneys, not less than 14 hands 2 inches and not exceeding 15 hands 2 inches	20	10	5
25	Pony Mare and Foal, not less than 13 hands 2 inches and not exceeding 14 hands 2 inches	15	10	5
	AGRICULTURAL OR CART MARES AND GELDINGS.			
26	Pair of Mares or Geldings, not less than 16 hands	30*	15*	10*
27	Pair of Mares or Geldings, under 16 hands	30*	15*	10*
28	Mare or Gelding, not less than 5 years old	20*	10*	5*
29	Mare or Gelding, 4 years old, not less than 16 hands	15*	10*	5*
30	Mare or Gelding, 4 years old, under 16 hands	15*	10*	5*
31	Gelding, 3 years old, any height	15*	10*	5*
32	Gelding, 2 years old, any height	15*	10*	5*
	CHAMPION PRIZE, Silver Cup, value 50 Guineas, for the best Agricultural Cart Mare or Gelding in the Show-Yard in Classes 13 to 22, and 26 to 32. Presented by Lieut.-Col. Stebble, J.P., ex-Mayor of Liverpool.			
	HUNTERS.			
33	Hunter Mare or Gelding, up to 15 stone, five years old or upwards	30*	15	10*
34	Hunter Mare or Gelding, up to 12 stone, five years old or upwards	30*	15*	10*
35	Hunter Mare or Gelding, four years old	30	15	10
36	Hunter Mare or Gelding, three years old	20	10	5
	HACKNEYS AND ROADSTERS.			
37	Hackney Mare or Gelding, exceeding 15 hands, and up to not less than 12 stone	15*	10*	5*
38	Hackney Mare or Gelding, exceeding 15 hands, and up to not less than 15 stone	15*	10*	5*
39	Hackney Mare or Gelding, above 14 and not exceeding 15 hands, up to 12 stone	15	10	5
40	Weight-carrying Hacks or Roadsters, above 14 and not exceeding 15 hands, up to 15 stone	15	10	5

Reference Number in Certificates.	HORSES—*continued.*	First Prize.	Second Prize.	Third Prize.	Fourth Prize.
Class		£.	£.	£.	£.
	PONIES.				
41	Pony Mare or Gelding, above 13 hands, and not exceeding 14 hands	15*	10*	5*	
42	Pony Mare or Gelding, not exceeding 13 hands ..	15*	10*	5*	
	There will be a Parade of Liverpool Cart Horses in Shaft and Chain gears on Saturday, July 14.				
	No Third Prize will be given unless at least Six animals be exhibited, and no Second Prize will be given unless at least Three animals be exhibited, except on the special recommendation of the Judges to the Stewards of Live Stock				
	CATTLE,				
	(ALL AGES CALCULATED TO JULY 1ST, 1877.)				
	SHORTHORN.				
43	Bull, above three years old	30	20	15	10
44	Bull, above two and not exceeding three years old	25	15	10	5
45	Yearling Bull, above one and not exceeding two years old	25	15	10	5
46	Bull-Calf, above six and not exceeding twelve months old	20	15	10	5
47	Cow, above three years old	20	15	10	5
48	Heifer, in-milk or in-calf, not exceeding three years old	20	15	10	5
49	Yearling Heifer, above one and not exceeding two years old	20	15	10	5
50	Heifer-Calf, above six and under twelve months old	20	15	10	5
51	Cow and not less than two of her offspring	50*	25*	10*	..
	A SILVER CUP, value £50, for the best Shorthorn Male in the Show-Yard. Given by the Right Hon. Lord Skelmersdale, President of the Society.				
	A SILVER CUP, value £30, for the best Shorthorn Female in the Show-Yard. Given by the Right Hon. the Earl of Bective.				
	HEREFORD.				
52	Bull, above three years old	25	15	5	
53	Bull, above two and not exceeding three years old	25	15	5	
54	Yearling Bull, above one and not exceeding two years old	25	15	5	
55	Bull-Calf, above six and not exceeding twelve months old	15	10	5	

Reference Number in Certificates.	CATTLE—*continued.*	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
56	Cow, above three years old	20	10	5
57	Heifer, in-milk or in-calf, not exceeding three years old	15	10	5
58	Yearling Heifer, above one and not exceeding two years old	15	10	5
59	Heifer-Calf, above six and under twelve months old	15	10	5
60	Cow and not less than two of her offspring	30*	15*	10*
	No Fourth Prize will be given in either of the Shorthorn Classes, Nos. 43 *to* 50, *unless at least Ten animals be exhibited.*			
	DEVON.			
61	Bull, above three years old	25	15	5
62	Bull, above two and not exceeding three years old	25	15	5
63	Yearling Bull, above one and not exceeding two years old	25	15	5
64	Bull-Calf, above six and not exceeding twelve months old	15	10	5
65	Cow, above three years old	20	10	5
66	Heifer, in-milk or in-calf not exceeding three years old	15.	10	5
67	Yearling Heifer, above one and not exceeding two years old	15	10	5
68	Heifer-Calf, above six and under twelve months old	15	10	5
	JERSEY.			
69	Bull, above two years old	20	10	5
70	Bull, above one year old and not exceeding two ..	20	10	5
71	Cow, above three years old	20	10	5
72	Heifer, in-milk or in-calf, not exceeding three years old	20	10	5
	GUERNSEY.			
73	Bull, above one year old	15	10	..
74	Cow, above three years old	15	10	..
75	Heifer, in-milk or in-calf, not exceeding three years old	15	10	..
	SUSSEX.			
76	Bull, above three years old	15	10	..
77	Bull, above two years old and not exceeding three	15	10	..
78	Yearling Bull, above one year old and not exceeding two	10	5	..
79	Cow, above three years old	15	10	..

Reference Number in Certificates.	CATTLE—*continued.*	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
80	Heifer, in-milk or in-calf, above two years old and not exceeding three	15	10	..
81	Yearling Heifer above one year old and not exceeding two	10	5	..
	NORFOLK AND SUFFOLK POLLED.			
82	Bull, above one year old	15	10	..
83	Cow, above three years old	15	10	..
84	Heifer, in-milk or in-calf, not exceeding three years old	15	10	..
	WELSH.			
85	Bull, two years old and upwards	15*	10*	5*
86	Bull, under two years old	15*	10*	5*
87	Cow, in-calf or in-milk, three years old or upwards	15*	10*	5*
88	Heifer, in-calf or in-milk, under three years old	15*	10*	5*
	LONG-HORN.			
89	Bull, of any age	15*	10*	5*
90	Cow, in-calf or in-milk, three years old or upwards	15*	10*	5*
91	Heifer, in-calf or in-milk, under three years old	15*	10*	5*
	AYRSHIRE.			
92	Bull of any age	15*	10*	5*
93	Cow or Heifer, in-calf or in-milk	15*	10*	5*
	POLLED GALLOWAY.			
94	Bull, of any age	15*	10*	5*
95	Cow or Heifer, in-calf or in-milk	15*	10*	5*
	DAIRY CATTLE.			
96	Pair of Cows of any breed, in-milk, milking properties to be specially considered	30*	20*	10*
97	Cow of any breed, in-milk, milking properties to be specially considered	15*	10*	5*

The Jersey and Guernsey Cows entered as in-milk, and the Dairy Cows in Classes 96 and 97 must be milked dry on the evening of July 10, in the presence of an officer of the Society.

No Third Prize will be given unless at least Six entries be exhibited, and no Second Prize will be given unless at least Three entries be exhibited, except on the special recommendation of the Judges to the Stewards of Stock.

Reference Number in Certificates.	SHEEP.	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
	LEICESTER.			
98	Shearling Ram	20	10	5
99	Ram of any other age	20	10	5
100	Pen of Five Shearling Ewes, of the same flock	15	10	5
	BORDER LEICESTER.			
101	Shearling Ram	20*	10*	5*
102	Ram, of any age	20*	10*	5*
103	Pen of Five Shearling Ewes, of the same flock	15*	10*	5*
	COTSWOLD.			
104	Shearling Ram	20	10	5
105	Ram of any other age	20	10	5
106	Pen of Five Shearling Ewes, of the same flock	15	10	5
	LINCOLN.			
107	Shearling Ram	20	10	5
108	Ram of any other age	20	10	5
109	Pen of Five Shearling Ewes, of the same flock	15	10	5
	OXFORDSHIRE DOWN.			
110	Shearling Ram	20	10	5
111	Ram of any other age	20	10	5
112	Pen of Five Shearling Ewes, of the same flock	15	10	5
	SOUTHDOWN.			
113	Shearling Ram	20	10	5
114	Ram of any other age	20	10	5
115	Pen of Five Shearling Ewes, of the same flock	15	10	5
	SHROPSHIRE.			
116	Shearling Ram	20	10	5
117	Ram of any other age	20	10	5
118	Pen of Five Shearling Ewes, of the same flock	15	10	5
	HAMPSHIRE AND OTHER SHORT-WOOLLED BREEDS.			
	Not qualified to compete as Southdown or Shropshire.			
119	Shearling Ram	20	10	5
120	Ram of any other age	20	10	5
121	Pen of Five Shearling Ewes, of the same flock	15	10	5

Reference Number in Certificates.	SHEEP—*continued.*	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
	CHEVIOT.			
122	Shearling Ram	10*	5*	3*
123	Ram, of any age	10*	5*	3*
124	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	BLACK-FACED MOUNTAIN.			
125	Shearling Ram	10*	5*	3*
126	Ram, of any age	10*	5*	3*
127	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	HERDWICK.			
128	Shearling Ram	10*	5*	3*
129	Ram, of any age	10*	5*	3*
130	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	LONK.			
131	Shearling Ram	10*	5*	3*
132	Ram, of any age	10*	5*	3*
133	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	CARNARVON.			
134	Shearling Ram	10*	5*	3*
135	Ram, of any age	10*	5*	3*
136	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	ROSCOMMON.			
137	Shearling Ram	10*	5*	3*
138	Ram, of any age	10*	5*	3*
139	Pen of Five Shearling Ewes, of the same flock ..	10*	5*	3*
	No Third Prize will be given unless at least Six entries be exhibited, and no Second Prize will be given unless at least Three entries be exhibited, except on the special recommendation of the Judges to the Stewards of Stock.			

Reference Number in Certificates.	PIGS.	First Prize.	Second Prize.	Third Prize.
Class		£.	£.	£.
	LARGE WHITE BREED.			
140	Boar, above six months and not exceeding twelve months old	10	5	..
141	Boar, above twelve months old	10	5	..
142	Pen of Three Breeding Sow-Pigs of the same litter, above three and not exceeding six months old	10	5	..
143	Breeding Sow	10	5	..
	SMALL WHITE BREED.			
144	Boar, above six months and not exceeding twelve months old	10	5	..
145	Boar, above twelve months old	10	5	..
146	Pen of Three Breeding Sow-Pigs of the same litter, above three and not exceeding six months old	10	5	..
147	Breeding Sow	10	5	..
	SMALL BLACK BREED.			
148	Boar, above six months and not exceeding twelve months old	10	5	..
149	Boar, above twelve months old	10	5	..
150	Pen of Three Breeding Sow-Pigs of the same litter, above three and not exceeding six months old	10	5	..
151	Breeding Sow	10	5	..
	BERKSHIRE BREED.			
152	Boar, above six months and not exceeding twelve months old	10	5	..
153	Boar, above twelve months old	10	5	..
154	Pen of Three Breeding Sow-Pigs of the same litter, above three and not exceeding six months old	10	5	..
155	Breeding Sow	10	5	..
	OTHER BREEDS.			
	Not eligible to compete in any of the preceding Classes.			
156	Boar, above six months and not exceeding twelve months old	10	5	..
157	Boar, above twelve months old	10	5	..

Reference Number in Certificates.	PIGS—*continued.*	First Prize	Second Prize.	Third Prize.	Fourth Prize.
Class		£	£	£	£
158	Pen of three Breeding Sow-Pigs of the same litter, above three and not exceeding six months old ..	10	5	..	..
159	Breeding Sow	10	5	..	..
	No Second Prize will be given unless at least Three entries be exhibited, except on the special recommendation of the Judges to the Stewards of Stock.				
	BUTTER.				
160	Firkin of Irish Butter	5*	3*	2*	..
161	Pot or Crock of Welsh Butter, 14 lbs. or upwards	5*	3*	2*	..
162	Pot or Crock of English Butter, 14 lbs. or upwards	5*	3*	2*	..
163	Firkin, Crock, or Package of Canadian, American, or Foreign Butter, not less than 14 lbs. each ..	5*	3*	2*	..
164	Six pounds of Fresh Butter (any make)	6*	5*	4*	3*
	A GOLD MEDAL,* to the Dairymaid, the Maker of Best Butter in Class 164.				
	The Exhibitor to be the manufacturer and *bona-fide* owner of the Butter in Classes 161, 162, and 164. Merchants, Dealers, or Manufacturers may compete in the Classes 160 and 163, but must state where the Butter is made, and give name of Factory or Farm.				
	CHEESE.				
	CHESHIRE.				
165	Three Cheeses above 50 lbs. weight each, coloured or plain	20*	15*	10*	..
166	Three Cheeses under 50 lbs. weight each, coloured or plain	15*	10*	5*	..
	LANCASHIRE.				
167	Three Cheeses, any weight, plain or coloured ..	20*	15*	10*	..

Reference Number in Certificates.	CHEESE—*continued.*	First Prize.	Second Prize.	Third Prize.
Class		£	£	£
	ANY OTHER BRITISH MAKE.			
168	Three Cheeses above 50 lbs. weight each	15*	10*	5*
169	Three Cheeses above 20 and under 50 lbs. weight each	15*	10*	5*
	CANADIAN, AMERICAN, OR FOREIGN.			
170	Three Cheeses above 40 lbs. weight each, coloured or plain	20*	15*	10*
	A GOLD MEDAL,* for the best lot of Cheese in any of the Classes.			
	The Exhibitor to be the Manufacturer and *bona-fide* owner of the Cheese in Classes 165 to 169. In Class 170 Exhibitors may be the Makers, Merchants or Dealers, but in the latter case the place where made or name of Factory must be given No Cheese exhibited to have been ironed or bored, or it will be disqualified.			
	HAMS AND BACON.			
	Open to Dealers, Curers, or Importers, but place of curing, brand, &c., to be stated.			
171	Six British Hams (long cut) from 18 to 28 lbs. each	20*	15*	10*
172	Six Canadian, American, or Foreign Hams (long cut) from 18 to 28 lbs. each	20*	15*	10*
	A GOLD MEDAL,* to the best of the previous two Classes.			
173	Three sides of British Bacon (Cumberland or Wiltshire cut) from 35 to 50 lbs. each	20*	15*	10*
174	Three sides of Canadian, American, or Foreign Bacon (ditto) from 35 to 50 lbs. each	20*	15*	10*
	A GOLD MEDAL,* to the best of the previous two Classes.			

CONDITIONS APPLYING TO CERTAIN CLASSES OF LIVE STOCK ONLY.

HORSES.

1. All foals must be the offspring of the mare along with which they are exhibited; and the sire of the foal must be given on the certificate of entry.

2. No veterinary inspection of horses will be required except when considered necessary by the Judges, who will be accompanied by the Veterinary Inspectors.

3. Hunters and Hackneys entered to compete in the light-weight classes will be disqualified if, in the opinion of the Judges, they are eligible to compete in the heavy-weight classes.

4. A charge of 1*l.* for the accommodation of a horse-box, in addition to the entry-fee, will be made for each entry for stallions and mares with foals at foot.

5. A charge of 10*s.* will be made, in addition to the entry-fee, for the accommodation of a stall for each animal in the other Horse Classes.

6. Any exhibitor wishing to remove his horse for the night will be allowed to do so on depositing 10*l.* at the Secretary's office, and receiving an official pass—the time of leaving, and that of returning next morning, to be inserted thereon; and if the animal be not duly brought back, the sum of 10*l.* will be forfeited to the Society for each Show day the animal is absent; and the exhibitor will also forfeit any prize awarded to him in any class at the Liverpool Show, and will not be allowed to exhibit again at the Society's Show until the forfeits are paid.

CATTLE.

7. No bull above two years old will be eligible for a prize unless certified to have served not less than three different cows (or heifers) within the three months preceding the 1st of June in the year of the Show.

8. All bulls above one year old shall have rings or "bull-dogs" in their noses, and be provided with leading sticks.

9. No cow will be eligible for a prize unless certified either at the date of entry or between the date of entry and that of the Show, to have had a living calf, or that the calf, if dead, was born at its proper time, within the twelve months preceding the date of the Show. Every Cow of the Channel Island breeds entered as in-milk, and every cow entered in the Dairy Classes, shall be milked dry on the evening preceding the Show, in the presence of an officer of the Society, specially appointed for the purpose.

10. No heifer, entered as in-calf, will be eligible for a prize unless she is certified to have been bulled before the 31st of March in the year of the Show, nor will her owner afterwards receive the prize until he shall have furnished the Secretary with a further certificate before the 31st of January in the subsequent year, that she produced a living calf; or that the calf, if dead, was born at its proper time.

11. Shorthorns.—Each animal entered in the Shorthorn Classes must be certified by the Exhibitor to be entered, or eligible to be entered, in Coates's Herd-Book.

12. All rams, except shearlings, must have been used in the preceding year.

13. Sheep exhibited for any of the prizes must have been *really and fairly shorn bare* after the 1st of April in the year of the Exhibition; and the

date of such shearing must form part of the Certificate of Entry. Inspectors will be appointed by the Council to examine the sheep on their admission to the Show-Yard, with instructions to report to the Stewards any cases in which the sheep have not been *really and fairly shorn bare.*

PIGS.

14. The three sow-pigs in each pen must be of the same litter.

15. The breeding sows in Classes 143, 147, 151, 155, and 159, shall be certified to have had a litter of live pigs within the six months preceding the Show, or to be in-pig at the time of entry, so as to produce a litter before the 1st of September following. In the case of in-pig sows, the prize will be withheld until the exhibitor shall have furnished the Secretary with a certificate of farrowing, as above.

16. No sow, if above eighteen months old, that has not produced a litter of live pigs, shall be eligible to compete in any of the classes.

17. The Judges of pigs will be instructed, with the sanction of the Stewards, to withhold prizes from any animals which shall appear to them to have been entered in a wrong class.

18. All pigs exhibited at the Country Meetings of the Society shall be subjected to an examination of their mouths by the Veterinary Inspector of the Society; and should the state of dentition in any pig indicate that the age of the animal has not been correctly returned in the Certificate of Entry, the Stewards shall have power to disqualify such pig, and shall report the circumstance to the Council at its ensuing Monthly Meeting. Every pig which shall be found on examination by the Inspector to be oiled or coloured will be disqualified for competition and removed from the Show-Yard; as well as any pig which shall be oiled or coloured while in the Show-Yard.

19. If a litter of pigs be sent with a breeding sow, the young pigs must be the produce of the sow, and must not exceed two months old.

RULES OF ADJUDICATION.

1. As the object of the Society in giving prizes for cattle, sheep, and pigs, is to promote improvement in *breeding* stock, the Judges, in making their awards, will be instructed not to take into their consideration the present value to the butcher of animals exhibited, but to decide according to their relative merits for the purpose of *breeding.*

2. If, in the opinion of the Judges, there should be equality of merit, they will be instructed to make a special report to the Council, who will decide on the award.

3. The Judges will be instructed to withhold any prize if they are of opinion that there is not sufficient merit in any of the stock exhibited for such prize to justify an award.

4. The Judges will be instructed to give in a *Reserved Number* in each class of live stock; viz., which animal would, in their opinion, possess sufficient merit for the prize, in case the animal to which the prize is awarded should subsequently become disqualified.

5. In the classes for stallions, mares, and fillies, the Judges in awarding the prizes will be instructed, in addition to symmetry, to take activity and strength into their consideration.

6. The attention of the Stewards and Judges is particularly called to the conditions applying to pigs. The Senior Steward of Live Stock is requested to report any malpractices on the part of Exhibitors, and any person found guilty will not be allowed to exhibit at future Meetings of the Society.

The Judges will be instructed to deliver to the Stewards their awards signed, and stating the numbers to which the prizes are adjudged, before they leave the Yard, noting any disqualifications. They are to transmit, under cover to the Secretary, immediately after the Show, their Reports on the several classes in which they have adjudicated, in order that each Report may be included in the General Report of the Exhibition of Live Stock at Liverpool, to be published in the 'Journal' of the Society.

II.—MEDALS FOR IMPLEMENTS AND MACHINERY OFFERED BY THE SOCIETY.

GOLD MEDAL.

The Gold Medal of the Society will be awarded at Liverpool or any future Meeting of the Society, for an efficient Sheaf-binding Machine, either attached to a reaper or otherwise.

SILVER MEDALS.

There are Ten Silver Medals, the award of which the Judges appointed by the Council have the power of recommending in cases of sufficient merit in New Implements exhibited at the Liverpool Meeting.

These Medals cannot *in any case* be awarded to any Implement, unless the principle on which the Implement is constructed be entirely new, and the Implement has never before been exhibited at any of the Society's Shows.

These Medals are specially intended as a mark of approval of any new principles of construction which the Judges may consider as *essential improvements;* subject always to the restriction contained in Rule 2.

The Judges are also empowered to make special awards of Medals for efficient modes of guarding or shielding Machinery, especially when worked by steam, from contact with persons immediately engaged in attending to such machinery while at work.

No Medal shall, in any case, be awarded to any Implement or Miscellaneous Articles capable of Trial until it has been subjected to such Trial as the Stewards may direct.

No Medal shall be awarded by the Judges without the consent of the Stewards, and no Commendation of Miscellaneous Articles shall be made by the Judges.

DATES OF ENTRY FOR LIVE STOCK AND IMPLEMENTS.

CERTIFICATES for the entry of Implements for the Liverpool Meeting must be forwarded to the Secretary of the Society, No. 12, Hanover Square, London, W., by the 1st of May, and Certificates for the entry of Live Stock by the 1st of June. Certificates received after those respective dates will not be accepted, but returned to the persons by whom they have been sent.

The Prizes of the Royal Agricultural Society of England, and all Prizes offered by the Liverpool Local Committee, are open to general competition.

⁂ Forms of Certificate for entry, as well as Prize-Sheets for the Liverpool Meeting, containing the whole of the conditions and regulations, may be obtained at the Office of the Society, No. 12, Hanover Square, London, W.

Members' Veterinary Privileges.

I.—Serious or Extensive Diseases.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that the Society's Veterinary Inspector should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l.* 2*s.* each day as a professional fee, and 1*l.* 1*s.* each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—Ordinary or Other Cases of Disease.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l.* 2*s.* per diem, and travelling expenses. Applications should be addressed to the Superintendent of the Brown Institution, care of the Secretary of the Royal Agricultural Society, 12, Hanover Square, London, W.

III.—Consultations without Visit.

Personal consultation with Veterinary Inspector	5*s.*
Consultation by letter	5*s.*
Consultation necessitating the writing of three or more letters	10*s.*
Post-mortem examination, and report thereon	10*s.*

A return of the number of applications from Members of the Society during each half-year is required from the Veterinary Inspector.

IV.—Admission of Diseased Animals to the Brown Institution, Wandsworth Road, London, S.W.; Investigations, Lectures, and Reports.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Brown Institution, on the following terms; viz., by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Professor-Superintendent according to circumstances."

No. 2. The Professor-Superintendent of the Institution has also undertaken to carry out such investigations relating to the nature, treatment, and prevention of diseases of cattle, sheep, and pigs, as may be deemed expedient by the Council.

No. 3. A detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary of the Institution, or on Farms in the occupation of Members of the Society, will be furnished to the Council quarterly; and also special reports from time to time on any matter of unusual interest which may come under the notice of the Institution.

By Order of the Council,
H. M. JENKINS, *Secretary.*

Members' Privileges of Chemical Analysis.

The Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.	An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample)	5*s.*
„ 2.	An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia	10*s.*
„ 3.	An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda	10*s.*
„ 4.	An analysis of superphosphate of lime for soluble phosphates only	10*s.*
„ 5.	An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia	£1.
„ 6.	An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure	£1.
„ 7.	Limestone:—the proportion of lime, 7*s.* 6*d.*; the proportion of magnesia, 10*s.*; the proportion of lime and magnesia	15*s.*
„ 8.	Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay	£1.
„ 9.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	£1.
„ 10.	Complete analysis of a soil	£3.
„ 11.	An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate	£1.
„ 12.	Analyses of any vegetable product	£1.
„ 13.	Analyses of animal products, refuse substances used for manure, &c.	from 10*s.* to 30*s.*
„ 14.	Determination of the "hardness" of a sample of water before and after boiling	10*s.*
„ 15.	Analysis of water of land drainage, and of water used for irrigation	£2.
„ 16.	Determination of nitric acid in a sample of water	£1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. Augustus Voelcker, F.R.S., 11, Salisbury Square, London, E.C., to which he requests that all letters and parcels (Postage and Carriage paid) should be directed.

By Order of the Council,
H. M. JENKINS, *Secretary.*

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

ARTIFICIAL MANURES.—Take a large handful of the manure from three or four bags, mix the whole on a large sheet of paper, breaking down with the hand any lumps present, and fold up in tinfoil, or in oil silk, about 3 oz. of the well-mixed sample, and send it to 11, Salisbury Square, Fleet Street, E.C., by post: or place the mixed manure in a small wooden or tin box, which may be tied by string, but must not be sealed, and send it by post. If the manure be very wet and lumpy, a larger boxful, weighing from 10 to 12 oz., should be sent either by post or railway.

Samples not exceeding 4 oz. in weight may be sent by post, by attaching two penny postage stamps to the parcel.

Samples not exceeding 8 oz., for three postage stamps.

Samples not exceeding 12 oz., for four postage stamps.

The parcels should be addressed: Dr. Augustus Voelcker, 11, Salisbury Square, Fleet Street, London, E.C., and the address of the sender or the number or mark of the article be stated on parcels.

The samples may be sent in covers, or in boxes, bags of linen or other materials. No parcel sent by post must exceed 12 oz. in weight, 1 foot 6 inches in length, 9 inches in width, and 6 inches in depth.

SOILS.—Have a wooden box made 6 inches long and wide, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil with its subsoil from 9 to 12 inches deep; trim this block or plan of the field to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid and send it by goods or parcel to the laboratory. The soil will then be received in the exact position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

WATERS.—Two gallons of water are required for analysis. The water, if possible, should be sent in glass-stoppered Winchester half-gallon bottles, which are readily obtained in any chemist and druggist's shop. If Winchester bottles cannot be procured, the water may be sent in perfectly clean new stoneware spirit-jars surrounded by wickerwork. For the determination of the degree of hardness before and after boiling, only one quart wine-bottle full of water is required.

LIMESTONES, MARLS, IRONSTONES, AND OTHER MINERALS.—Whole pieces, weighing from 3 to 4 oz., should be sent enclosed in small linen bags, or wrapped in paper. Postage 2*d*., if under 4 oz.

OILCAKES.—Take a sample from the middle of the cake. To this end break a whole cake into two. Then break off a piece from the end where the two halves were joined together, and wrap it in paper, leaving the ends open, and send parcel by post. The piece should weigh from 10 to 12 oz. Postage, 4*d*. If sent by railway, one quarter or half a cake should be forwarded.

FEEDING MEALS.—About 3 oz. will be sufficient for analysis. Enclose the meal in a small linen bag. Send it by post.

On forwarding samples, separate letters should be sent to the laboratory, specifying the nature of the information required, and, if possible, the object in view.

H. M. JENKINS, *Secretary.*

Members' Botanical Privileges.

The Council have provisionally fixed the following Rates of Charge for the examination of Plants and Seeds for the *bonâ fide* use of Members of the Society, who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined Schedule. The charge for examination must be paid to the Consulting Botanist at the time of application, and the carriage of all parcels must be prepaid.

No. 1.—	A general opinion as to the genuineness and age of a sample of clover-seed (each sample)	5s.
„ 2.—	A detailed examination of a sample of dirty or impure clover-seed, with a report on its admixture with seeds of dodder or other weeds (each sample)	10s.
„ 3.—	A test examination of turnip or other cruciferous seed, with a report on its germinating power, or its adulteration with 000 seed (each sample)	10s.
„ 4.—	A test examination of any other kind of seed, or corn, with a report on its germinating power (each sample) ..	10s.
„ 5.—	Determination of the species of any indigenous British plant (not parasitic), with a report on its habits (each species)	5s.
„ 6.—	Determination of the species of any epiphyte or vegetable parasite, on any farm-crop grown by the Member, with a report on its habits, and suggestions (where possible) as to its extermination or prevention (each species) ..	10s.
„ 7.—	Report on any other form of plant-disease not caused by insects	10s.
„ 8.—	Determination of the species of a collection of natural grasses indigenous to any district on one kind of soil (each collection)	10s.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES.

In sending seed or corn for examination the utmost care must be taken to secure a fair and honest sample. If anything supposed to be injurious or useless exists in the corn or seed, selected samples should also be sent.

In collecting specimens of plants, the whole plant should be taken up, and the earth shaken from the roots. If possible, the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. Place them in a bottle, or pack them in tin-foil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

N.B.—*The above Scale of Charges is not applicable in the case of Seedsmen requiring the services of the Consulting Botanist.*

Parcels or letters (Carriage or Postage prepaid) to be addressed to Mr. W. Carruthers, F.R.S., 4, Woodside Villas, Gipsy Hill, S.E.

H. M. JENKINS, *Secretary.*

Royal Agricultural Society of England.

1877.

President.

COLONEL KINGSCOTE, C.B., M.P.

Trustees.

Year when Elected.	
1855	**Acland**, Sir **Thomas Dyke**, Bart., M.P., *Sprydoncote, Exeter, Devonshire.*
1857	**Bridport**, Viscount, *Cricket St. Thomas, Chard, Somersetshire.*
1850	**Chesham**, Lord, *Latimer, Chesham, Bucks.*
1861	**Dent**, J. D., *Ribston Hall, Wetherby, Yorkshire.*
1863	**Kingscote**, Colonel, M.P., *Kingscote, Wootton-under-Edge, Gloucestershire.*
1868	**Lichfield**, Earl of, *Shugborough, Staffordshire.*
1854	**Macdonald**, Sir **Archibald Keppel**, Bt., *Woolmer Lodge, Liphook, Hants.*
1860	**Marlborough**, Duke of, K.G., *Blenheim Park, Oxford.*
1846	**Milward**, **Richard**, *Thurgarton Priory, Southwell, Notts.*
1839	**Portman**, Viscount, *Bryanston, Blandford, Dorset.*
1856	**Powis**, Earl of, *Powis Castle, Welshpool, Montgomeryshire*
1858	**Rutland**, Duke of, K.G., *Belvoir Castle, Grantham, Leicestershire.*

Vice-Presidents.

1873	**Bedford**, Duke of, *Woburn Abbey, Bedfordshire.*
1861	**Cathcart**, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
1839	**Chichester**, Earl of, *Stanmer Park, Lewes, Sussex.*
1867	**Devonshire**, Duke of, K.G., *Holker Hall, Lancashire.*
1847	**Eversley**, Viscount, *Heckfield Place, Winchfield, Hants.*
1848	**Gibbs**, B. T. **Brandreth**, *Halfmoon Street, Piccadilly, London*, W.
1858	**Kerrison**, Sir **Edward C.**, Bart., *Brome Hall, Scole, Suffolk.*
1839	**Miles**, Sir **William**, Bart., *Leigh Court, Bristol, Somersetshire.*
1852	**Richmond and Gordon**, Duke of, K.G., *Goodwood, Chichester, Sussex.*
1859	**Vernon**, Lord, *Sudbury Hall, Derby.*
1861	**Wells**, **William**, *Holmewood, Peterborough, Northamptonshire.*
1855	**Wynn**, Sir **Watkin Williams**, Bart., M.P., *Wynnstay, Ruabon, Denbighshire.*

Other Members of Council.

1858	**Amos**, **Charles Edwards**, 5, *Cedars Road, Clapham Common, Surrey.*
1877	**Arkwright**, J. H., *Hampton Court, Leominster, Herefordshire.*
1875	**Aveling**, **Thomas**, *Rochester, Kent.*
1875	**Aylmer**, **Hugh**, *West Dereham, Stoke Ferry, Norfolk.*
1868	**Booth**, **Thomas Christopher**, *Warlaby, Northallerton, Yorkshire.*
1863	**Bowly**, **Edward**, *Siddington House, Cirencester, Gloucestershire.*
1861	**Cantrell**, **Charles S.**, *Riding Court, Datchet, Bucks.*
1866	**Davies**, **David Reynolds**, *Agden Hall, Lymm, Cheshire.*
1860	**Druce**, **Joseph**, *Eynsham, Oxford.*
1868	**Edmonds**, **William John**, *Southrop, Lechlade, Gloucestershire.*
1871	**Egerton**, Hon. **Wilbraham**, M.P., *Rostherne Manor, Knutsford, Cheshire.*
1867	**Eslington**, Lord, M.P., *Ravensworth Castle, Durham.*
1873	**Evans**, **John**, *Uffington, Shrewsbury, Salop.*
1876	**Feversham**, Earl of, *Duncombe Park, Helmsley, Yorkshire.*
1875	**Frankish**, **William**, *Limber Magna, Ulceby, Lincolnshire.*

Year when Elected	
1874	Hemsley, John, *Shelton, Newark, Notts.*
1873	Hobley, Thomas, Jun., *The Fosse, Leamington, Warwickshire.*
1866	Hornsby, Richard, *Spittle Gate, Grantham, Lincolnshire.*
1876	Howard, Charles, *Biddenham, Bedford.*
1871	Jones, J. Bowen, *Ensdon House, Montford Bridge, R.S.O., Salop.*
1848	Lawes, John Bennet, *Rothamsted, St. Albans, Herts.*
1869	Leeds, Robert, *Keswick Old Hall, Norwich.*
1872	Leicester, Earl of, K.G., *Holkham Hall, Wells, Norfolk.*
1874	Lindsay, Colonel Loyd, M.P., *Lockinge Park, Wantage, Berkshire.*
1865	Lopes, Sir Massey, Bart., M.P., *Maristow, Roborough, Devon.*
1871	McIntosh, David, *Havering Park, Romford, Essex.*
1874	Martin, Joseph, *Highfield House, Littleport, Isle of Ely, Cambridgeshire.*
1871	Masfen, R. Hanbury, *Pendeford, Wolverhampton, Staffordshire.*
1875	Musgrave, Sir R. C., Bart., *Edenhall, Penrith, Cumberland.*
1857	Pain, Thomas, *The Grove, Basingstoke, Hants.*
1874	Pole-Gell, H. Chandos, *Hopton Hall, Wirksworth, Derbyshire.*
1861	Randell, Charles, *Chadbury, Evesham, Worcestershire.*
1875	Ransome, Robert Charles, *Ipswich, Suffolk.*
1871	Rawlence, James, *Bulbridge, Wilton, Salisbury, Wilts.*
1869	Ridley, Sir M. White, Bart., M.P., *Blaydon, Cramlington, Northumberland.*
1861	Rigden, William, *Ashcroft, Kingston-by-Sea, Shoreham, Sussex.*
1875	Russell, Robert, *Farningham, Dartford.*
1874	Sanday, George Henry, *Wensley House, Bedale, Yorkshire.*
1856	Shuttleworth, Joseph, *Hartsholme Hall, Lincoln.*
1872	Skelmersdale, Lord, *Lathom Hall, Ormskirk, Lancashire.*
1874	Spencer, Earl, K.G., *Althorpe, Northampton.*
1875	Stratton, Richard, *The Duffryn, Newport, Monmouthshire.*
1873	Torr, John, M.P., *Carlett Park, Eastham, Chester.*
1874	Turbervill, Major Picton, *Ewenny Priory, Bridgend, South Wales.*
1845	Turner, George, *Great Bowley, Tiverton, Devonshire.*
1871	Turner, Jabez, *Haddon, Yaxley, Huntingdonshire.*
1871	Wakefield, William H., *Sedgwick, Kendal, Westmoreland.*
1870	Welby-Gregory, Sir William Earle, Bart., M.P., *Denton Hall, Grantham, Lincolnshire.*
1870	Whitehead, Charles, *Barming House, Maidstone, Kent.*
1865	Wilson, Jacob, *Woodhorn Manor, Morpeth, Northumberland.*

Secretary and Editor.

H. M. JENKINS, 12, *Hanover Square, London,* W.

Consulting Chemist—Dr. Augustus Voelcker, F.R.S., 11, *Salisbury Square,* E.C.

Consulting Botanist—W. Carruthers, F.R.S., F.L.S., *British Museum,* W.C.

Consulting Veterinary Surgeon—James Beart Simonds, *Royal Veterinary College, Camden Town.* N.W.

Officers of the Brown Institution, Wandsworth Road, S.W.—Dr. J. Burdon Sanderson, F.R.S., *Professor Superintendent;* W. Duguid, *Veterinary Inspector.*

Consulting Engineers—Eastons & Anderson, 3, *Whitehall Place,* S.W.

Surveyor—George Hunt, *Evesham, Worcestershire.*

Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.

Publisher—John Murray, 50, *Albemarle Street,* W.

Bankers—The London and Westminster Bank, *St. James's Square Branch,* S.W.

STANDING COMMITTEES FOR 1877.

Finance Committee.

Kingscote, Colonel (Chairman).
Bridport, Viscount.
Booth, T. C.
Randell, Charles.
Ridley, Sir M. White, Bt.
Shuttleworth, J.

House Committee.

The President.
Chairman of Finance Committee.
Bridport, Viscount.
Cantrell, C. S.
Gibbs, B. T. Brandreth.

Journal Committee.

Dent, J. D. (Chairman).
Cathcart, Earl.
Spencer, Earl.
Vernon, Lord.
Welby-Gregory, Sir W. E., Bt.
Hemsley, J.
Jones, J. Bowen.
Kingscote, Colonel.
Milward, Richard.
Ransome, R. C.
Ridley, Sir M. White, Bt.
Turbervill, Major.
Wells, W.
Whitehead, Charles.

Chemical Committee.

Wells, William (Chairman).
Bedford, Duke of.
Lichfield, Earl of.
Vernon, Lord.
Welby-Gregory, Sir W. E., Bt.
Aveling, T.
Dent, J. D.
Edmonds, W. J.
Jones, J. Bowen.
Lawes, J. B.
Voelcker, Dr. A.
Wakefield, W. H.
Whitehead, Charles.
Wilson, Jacob.

Botanical Committee.

Whitehead, Charles (Chairman).
Vernon, Lord.
Edmonds, W. J.
Frankish, W.
Gibbs, B. T. Brandreth.
Hemsley, J.
Jones, J. Bowen.
Russell, R.
Turbervill, Major.
Turner, Jabez.
Voelcker, Dr.
Wells, W.

Veterinary Committee.

Egerton, Hon. Wilbraham (Chairman).
Cathcart, Earl.
Bridport, Viscount.
Booth, T. C.
Brown, Professor.
Carpenter, Dr.
Duguid, W.
Gibbs, B. T. Brandreth.
Harpley, M. J.
Kingscote, Colonel.
Lindsay, Colonel Loyd.
Milward, R.
Pole-Gell, H. Chandos.
Quain, Dr.
Ridley, Sir M. White, Bt.
Sanday, G. H.
Sanderson, Dr. J. Burdon.
Simonds, Professor.
Wakefield, W. H.
Wells, William.
Wilson, Jacob.

Stock-Prizes Committee.

Milward, Richard (Chairman).
Bridport, Viscount.
Musgrave, Sir R. C.
Aylmer, H.
Booth, T. C.
Bowly, Edward.
Evans, John.
Gibbs, B. T. Brandreth.
Hemsley, J.
Horley, Thomas.
Leeds, Robert.
McIntosh, D.
Martin, J.
Masfen, R. H.
Pain, T.
Pole-Gell, H. Chandos.
Ridley, Sir M. White, Bt.
Rigden, William.
Sanday, G. H.
Stratton, R.
Torr, J.
Turner, George.
Wakefield, W. H.
Wilson, Jacob.
The Stewards of Live Stock.

Implement Committee.

Hemsley, J. (Chairman).
Bridport, Viscount
Macdonald, Sir A. K.
Amos, C. E.
Aveling, T.
Booth, T. C.
Cantrell, Chas. S.
Edmonds, W. J.
Evans, John.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Jones, J. Bowen.
Leeds, Robert.
Martin, J.
Masfen, R. H.
Milward, R.
Ransome, R. C.
Sanday, G. H.
Shuttleworth, Joseph.
Turbervill, Major.
Turner, Jabez.
Whitehead, Charles.
Wilson, Jacob.
The Stewards of Implements.

General Bristol Committee.

Skelmersdale, Lord (Chairman).
Bridport, Viscount.
Chesham, Lord
Lopes, Sir Massey, Bt.
Musgrave, Sir R., Bt.
Aveling, T.
Aylmer, H.
Booth, T C.
Bowly, Edward.
Bristol, High Sheriff of.
Bristol, Mayor of.
Cantrell, Charles S.
Dyke, T.
Egerton, Hon. W.
Frankish, W.
Gibbs, B. T. Brandreth.
Hemsley, J.
Horley, T., Jun.
Hornsby, Richard.
Jones, J. A.
Jones, J. Bowen.
Martin, J.
Masfen, R. H.
Milward, Richard.
Nichols, George.
Pole-Gell, H Chandos.
Randell, Charles.
Ransome, R C.
Rawlence, J
Sanday, G. H.
Shuttleworth, J
Stratton, R.
Thomas, Christopher J.
Turbervill, Major P.
Turner, George.
Turner, Jabez.
Wakefield, W. H.
Wells, W.
Whitehead, Charles
Wilson, Jacob.

Show-Yard Contracts Committee.

Wilson, Jacob (Chairman).
Bridport, Viscount.
Vernon, Lord.
Amos, C. E.
Aveling, T.
Booth, T. C.
Frankish, W.
Gibbs, B. T. Brandreth.
Horley, T.
Hornsby, Richard.
Milward, Richard.
Shuttleworth, Joseph.
Stratton, R.

Committee of Selection.

Milward, R. (Chairman).
Cathcart, Earl.
Bridport, Viscount.
Egerton, Hon. W.
Booth, T. C.
Wilson, Jacob.

And the Chairmen of the Standing Committees.

Education Committee.

Bedford, Duke of (Chairman).
Dent, J. D.
Howard, Charles.
Jones, J. Bowen.
Kingscote, Colonel.
McIntosh, David.
Turbervill, Major P.
Voelcker, Dr.
Wells, William.
Whitehead, Charles.

Cattle Plague Committee.

The whole Council.

⁂ The President, Trustees, and Vice-Presidents are Members *ex officio* of all Committees.

Royal Agricultural Society of England.

GENERAL MEETING,

12, Hanover Square, Tuesday, May 22nd, 1877.

REPORT OF THE COUNCIL.

The Council of the Royal Agricultural Society have to report that, since the last General Meeting in December, the following changes have taken place in the list of Members :—1 Governor and 43 Members have died, 127 Members resigned in the course of 1876, and the names of 36 others have been struck off the list by order of the Council. On the other hand, 178 Members and 6 Honorary Members have been elected, so that the Society now consists of :—

81	Life Governors,
76	Annual Governors,
2239	Life Members,
4073	Annual Members,
17	Honorary Members.
6486	Total . .

The Council announce with great regret the death of Mr. Chandos Wren Hoskyns, who was for many years an active Member of the Council, and after the death of Mr. Pusey was co-editor of the 'Journal,' and a valued contributor to its pages. The vacancy in the Council has been filled by the election of Mr. J. H. Arkwright, of Hampton Court, Herefordshire.

The Accounts for the year 1876 have been examined and certified by the Auditors and Accountants of the Society, and have been published in the last number of the 'Journal,' together with the statement of receipts and expenditure connected with the Birmingham Meeting. The funded property of the Society remains the same as at the last General Meeting, viz., 22,334*l.* 0*s.* 5*d.* New Three per Cents., and the balance of the current account in the hands of the bankers, on the 1st instant, was 2,028*l.* 11*s.* 2*d.*; while the sum of 2000*l.* remained on deposit.

The Liverpool Meeting, which will be held on July 11th, and four following days (Sunday excepted), subject to the exhibition of cattle being permitted, will probably equal, if even it does not surpass, the unexampled Show held last year at Birmingham. The Council have already reported the exceptionally large additions which the Local Committee have made to the enhanced scale of prizes offered by the Society; and they have now only to add, that every requirement of the Council has been met by the Local Committee in the most ready and liberal manner, and every endeavour has been made to insure the success of the Meeting.

The district assigned for the Country Meeting of 1878 comprises South Wales and the counties of Gloucester, Hereford, Monmouth, and Worcester. The Council have put in force the new plan of themselves selecting the town at which the Country Meeting will be held, provided that the authorities are willing to comply with the Society's requirements. The result of this first experiment of selecting the town without competition has been highly satisfactory, and the authorities of Bristol, which city has not been visited by the Society for thirty-five years, have undertaken to give the Council the accommodation required for the Meeting of 1878.

The Council have revised the grouping of counties into districts for the holding of the Country Meetings in rotation, and have adopted the following scheme, to take effect after next year:—

1879.

A. Norfolk.
Suffolk.
Cambridgeshire.
Huntingdonshire.
Bedfordshire.
Buckinghamshire.
Oxfordshire.
Hertfordshire.
Middlesex.
Essex.

1880.

B. Northumberland.
Cumberland.
Durham.
Westmoreland.

1881.

C. Derbyshire.
Leicestershire.
Lincolnshire.
Northamptonshire.
Nottinghamshire.
Rutland.

1882.

D. Cornwall.
Devonshire.
Dorsetshire.
Somersetshire.
Wiltshire.
Hampshire.
Berkshire.
Surrey.
Sussex.
Kent.

1883.

E. Yorkshire.

1884.

F. Staffordshire.
Shropshire.
Warwickshire.
Worcestershire.
Herefordshire.
Gloucestershire.
South Wales.

1885.

G. Cheshire.
Lancashire.
North Wales.

The Council have appointed a Committee to ascertain what sites may be available and suitable for the Society's Show in 1879, in the Metropolitan area, within District A.

The Council have watched with the greatest anxiety and alarm the progress of the outbreaks of Cattle-plague in London and Hull, as published in the spring number of the 'Journal.' They represented to the Lord President of the Council the necessity of protecting English herds from this and other foreign contagious diseases, by prohibiting for the future the importation of Live Stock from European ports, and by enforcing uniform and compulsory measures for the suppression of contagious diseases amongst farm-stock throughout the kingdom. Upon the extension of the outbreak beyond the Metropolitan area into Middlesex, the Council urged the Lord President to supersede the local authorities in London and Middlesex, and if necessary in the Home Counties. An Order in Council was issued on the following day, placing the whole of the Metropolitan Police district under the immediate jurisdiction of the Privy Council, and making regulations to insure the detection as well as the prevention of the further spread of the disease.

The experiments on the Duke of Bedford's farm at Woburn are in progress, under the supervision of Mr. Lawes and Dr. Voelcker; and the investigations into pleuro-pneumonia and foot-and-mouth disease are being continued at the Brown Institution by Dr. Burdon Sanderson.

The Council have to report that four candidates competed for the Society's Medals and Prizes offered to Members of the Royal College of Veterinary Surgeons for proficiency in the pathology, causes, symptoms, and treatment (preventive and curative) of cattle, sheep, and pigs. The successful candidates were Mr. A. B. Daniel, Gold Medal and 20*l.*; Mr. M. C. Yaxley, Silver Medal and 10*l.*; Mr. F. Smith, Bronze Medal and 5*l.*

They have also to report that eight candidates presented themselves last month for examination for the Society's Senior Prizes and Certificates, including the life membership of the Society. The result of the examination was as follows:—

Mr. Cecil Cautley Baker, recently of the Royal Agricultural College, Cirencester, and Mr. Alexander Campbell Dixon, of Hartshill, near Atherstone, and formerly of the North of England Agricultural School, have gained first-class certificates and the life-membership of the Society. The former is also entitled to the first prize of 25*l.*, and the latter to the second prize of 15*l.* Mr. Robert Leaper Pudney, of the Royal Agricultural College, has obtained a second-class certificate.

By order of the Council,

H. M. JENKINS,

Secretary.

ROYAL AGRICULTURAL

DR.

HALF-YEARLY CASH ACCOUNT

	£. s. d.	£ s. d.	£ s. d.
To Balance in hand, 1st January, 1877:—			
Bankers		327 7 1	
Secretary		27 16 7	
			355 3 8
To Income:—			
Dividends on Stock		330 16 5	
Subscriptions:—			
Governors' Annual	310 0 0		
Members' Life-Compositions	734 0 0		
Members' Annual	3187 18 0		
		4,231 18 0	
Journal:—			
Sales	69 5 6		
Advertisements	51 12 10		
		120 18 4	
Establishment:—			
Rent		100 0 0	
Birmingham Meeting		121 8 6	
Total Income		4,905 1 3	
To Liverpool Meeting		6,594 17 8	
			11,499 18 11
			£11,855 2 7

BALANCE-SHEET,

LIABILITIES.

	£ s. d.	£ s. d.	£ s. d.
To Capital:—			
Surplus, 31st December, 1876		25,520 13 8	
Surplus of Income over Expenditure during the Half-year, viz.:—			
Income	4,905 1 3		
Expenditure	3,144 3 3		
		1,760 18 0	
			27,281 11 8
Less half-year's interest and depreciation on Country Meeting Plant		.. .. ..	172 2 8
			£27,109 9 0

QUILTER, BALL, & CO., *Accountants.*

SOCIETY OF ENGLAND.

FROM 1ST JANUARY TO 30TH JUNE, 1877. Cr.

	£ s. d.	£ s. d.	£ s. d.
By Expenditure:—			
Establishment:—			
Salaries, Wages, &c.	592 10 0		
House:—Rent, Taxes, Repairs, &c.	360 1 8		
Office:—Printing, Postage, Stationery, &c.	252 14 10		
		1,205 6 6	
Journal:—			
Printing and Stitching	480 17 9		
Postage and Delivery	165 10 0		
Literary Contributions	176 16 0		
Woodcuts	78 1 6		
Advertising	6 19 0		
		908 4 3	
Chemical:—			
Consulting Chemist's Salary	150 0 0		
Grant for Investigations	200 0 0		
		350 0 0	
Veterinary:—			
The Brown Institution for Investigations to Christmas, 1876	250 0 0		
Prizes and Medals	47 12 0		
Fees to Examiners	34 13 0		
Professional Fee	2 2 0		
		334 7 0	
Botanical:—			
Consulting Botanist's Salary		50 0 0	
Education:—			
Fees to Examiners	56 16 6		
Printing, Advertising, &c.	36 2 6		
Prizes	40 0 0		
		132 19 0	
Subscriptions (paid in error) returned		4 0 0	
Sundries:—			
Expenses of Inspection Committee	23 6 6		
Secretary's Journey to Hamburg Dairy Show	23 0 0		
		46 6 6	
Farm Inspection:—			
Advertising		47 14 6	
Birmingham Meeting		45 5 6	
Total Expenditure		3,144 3 3	
By Liverpool Meeting		3,409 5 8	
			6,533 8 11
By Balance in hand, 30th June —			
Bankers	3,295 17 2		
Secretary	5 16 6		
		3,301 13 8	
At Deposit, London and Westminster Bank		2,000 0 0	
			5,301 13 8
			£11,855 2 7

30TH JUNE, 1877.

ASSETS.	£ s. d.	£ s. d.
By Cash in hand	3,301 13 8	
By New 3 per Cent. Stock 22,334*l* 0*s* 5*d* cost*	21,340 7 1	
By Books and Furniture in Society's House	1,451 17 6	
By Country Meeting Plant	2,122 19 5	
By Deposit Account	2,000 0 0	
		30,216 17 8
Less at credit of Liverpool Meeting	.. .. ..	3,107 8 8
		£27,109 9 0

* *Value at 94¾ = £21,161 9s. 8d.*

Mem.—The above Assets are exclusive of the amount recoverable in respect of arrears of Subscription to 30th June, 1877, which at that date amounted to 1703*l*.

Examined, audited, and found correct, this 20th day of August, 1877.

FRANCIS SHERBORN,
A. H. JOHNSON,
HENRY CANTRELL.
} *Auditors on behalf of the Society.*

SHOW AT LIVERPOOL,

JULY, 1877.

STEWARDS OF THE YARD.

Stock.

Hon. W. Egerton, M.P.,
Joseph Shuttleworth,
William Wells,
Sir R. C. Musgrave, Bart.
William H. Wakefield.

Implements.

J. Bowen Jones,
John Hemsley,
G. H. Sanday.

Forage.

Thomas Rigby.

General Arrangements.

Jacob Wilson.

JUDGES OF STOCK.

HORSES.

Agricultural Horses.

W. T. Lamb,
B. Spraggon,
A. Tomlinson.

Clydesdales and Suffolk.

Robert Findlay,
William Thompson,
A. Turnbull.

Thoroughbred and Riding Horses.

C. Aldridge,
Col. Luttrell,
Wm. Parker.

CATTLE.

Shorthorns.

Hugh Aylmer,
H. W. Beauford,
Wm. Sanday.

Herefords.

Francis Evans,
Wm. Groves.

Devons, Sussex, and Norfolk and Suffolk Polled.

Edward Cane,
Thomas Potter,
James Tremain.

Jerseys and Guernseys.

Walter Gilbey,
H. Tait.

Longhorns, Dairy Cattle, Ayrshire, and Polled Galloways.

W. Brakenridge,
J. H. Burbery,
T. Gibbons.

Welsh Cattle and Sheep.

A. Laurie,
John Williams.

SHEEP.

Leicesters.

F. Spencer,
C. W. Tindall.

Border Leicesters, Cheviots, and Roscommons.

John Clay,
George Rea,
James Simpson.

Cotswolds.

R. Garne,
T. Walker.

Lincolns.

T. Casswell,
C. Clarke.

Oxfordshire Downs.

H. Overman,
E. Little,
J. E. Rawlence.

Southdowns and Hampshires.

E. Little,
J. E. Rawlence,
J. S. Turner.

Shropshires.

John Evans,
Thomas Horley,
Thomas Instone.

Black-faced Mountains, Lonks, and Herdwicks.

John Hogarth,
John Ingleby,
John Irving.

PIGS.

John Angus,
John Dale,
John Lynn.

Veterinary Inspectors.

Professor Brown,
R. L. Hunt,
W. Duguid.

Inspectors of Shearing.

W. Jobson,
J. B. Workman.

JUDGES OF CHEESE.

F. Barrett,
G. Lewis.

JUDGES OF BUTTER.

William Clarke,
M. Hudson,
J. Watson.

JUDGES OF PROVISIONS.

Thomas Harris,
N. Kilvert.

JUDGES OF IMPLEMENTS.

Sheaf Binders.

John Coleman,
Henry Cantrell.

Miscellaneous, &c.

J. W. Kimber,
John Thompson,
S. Rowlandson.

FARM JUDGES.

Dairy Class.

W. T. Carrington,
Edward Little,
J. C. Morton.

Arable Class.[*]

J. D. Ogilvie,
T. P. Outhwaite,
S. D. Shirreff.

AWARD OF PRIZES.

NOTE.—The Judges were instructed, in addition to awarding the Prizes, to designate as the *Reserve Number* one animal in each Class, next in order of merit, if it possessed sufficient for a Prize; in case an animal to which a Prize was awarded should subsequently become disqualified.

Prizes given by the Liverpool Local Committee are marked thus (*).

HORSES.

Agricultural Stallions foaled before the 1st of January, 1875.

THE EARL OF ELLESMERE, Worsley Hall, Manchester: FIRST PRIZE, 50*l*., for "Young Samson," bay 6 years-old; bred by Mr. Richardson, Chatteris, Cambridgeshire; sire, "Samson;" dam by "Old Major."

WILLIAM WYNN, Ryon Hill Farm, Stratford-on-Avon, Warwickshire: SECOND PRIZE, 20*l*., for "Nonpareil," dappled bay, 9 years-old; bred by Mr. G. Malin, Harvington, Evesham, Worcestershire; sire, "A 1;" dam, "Matchless," by "King of the Valley."

THE STAND STUD COMPANY, Stand, Whitefield, Manchester: THIRD PRIZE: 10*l*., for "Young Champion," chestnut, 10 years-old; bred by Mr. Stokes, Caldecot, Rockingham, Northamptonshire; sire, Stoke's "Champion."

JOHN NIX, Outseats, Alfreton, Derby: the *Reserve Number*, to "Beauchieff," bay, 6 years-old; bred by Mr. Sampson, Beauchieff Abbey, Sheffield; sire, "Devonshire Lad;" dam by "Comet."

Agricultural Stallions—Two Years-old.

THE EARL OF ELLESMERE, Worsley Hall: FIRST PRIZE, 50*l*., for "Samson 2nd," chestnut; bred by Mr. Richardson, Mepal, Cambridgeshire; sire, Lord Ellesmere's "Young Samson;" dam by "Mott's Horse."

FREDERICK STREET, Somersham Park, St. Ives, Hunts: SECOND PRIZE, 20*l*., for "British Wonder," chestnut; bred by Mr. C. Beart, Stow, King's Lynn; sire, Marster's "England's Wonder."

CHARLES MARSTERS, Saddlebow, King's Lynn, Norfolk: THIRD PRIZE, 10*l*., for "Topsman," chestnut; bred by Mr. W. Saberton, Haddenham, Ely, Cambridgeshire; sire, "Champion."

JOHN ROWELL, Manor Farm, Bury, Huntingdon: the *Reserve Number*, to "Young Drayman," dark chestnut; bred by Mr J. Smith, Willingham, Cambs; sire, "Drayman;" dam by "Farmer's Glory."

*Agricultural Stallions—One Year-old.**

Charles Beart, Stow Bardolph, Downham Market, Norfolk: **First Prize**, 15*l.*, for "Wonder," chestnut; bred by himself; sire, Wiseman's "Wonder;" dam, "Lioness," by "Nonpareil."

The Earl of Ellesmere, Worsley Hall, Manchester: **Second Prize**, 10*l.*, for "Cambridge Tom," bay; bred by Mr. H. Edwards, Waterbeach, Cambridgeshire; sire, Bultitaft's "Honest Tom."

Lawrence Drew, Merryton, Hamilton, Lanark: **Third Prize**, 5*l.*, for his black; bred by himself; sire, "Prince of Wales;" dam, "Jessie Brown."

The Earl of Ellesmere, Worsley Hall: the *Reserve Number*, to "Admiral," bay; bred by Mr. Milnes, Kirkham; sire, "Honest Tom;" dam by "British Ensign."

Clydesdale Stallions foaled before the 1st of January, 1875.

James Firth Crowther, Knowle Grove, Mirfield, Yorkshire: **First Prize**, 50*l.*, for "Topsman," dark chestnut, 8 years-old; bred by Mr. George Wilson, Whiteside, Alford, Aberdeenshire; sire, "Wonderful;" dam by "Samson."

David Riddell, Blackhall, Paisley, Renfrewshire: **Second Prize**, 20*l.*, for "Paisley," bay, 5 years-old; bred by Mr. W. Roberton, Old Hall, Paisley; sire, "Conqueror;" dam by "Hercules."

Andrew Gemmell, Jun., Caplaw, Neilston, Renfrewshire: **Third Prize**, 10*l.*, for "Gleniffer," black, 5 years-old; bred by himself; sire, "Conqueror;" dam, "Jane," by "Hercules."

Clydesdale Stallions—Two Years-old.

John Thompson, Baillieknowe, Kelso, Roxburghshire: **First Prize**, 50*l.*, for "Lord Salisbury," dark bay; bred by Mr. J. Cunningham, Tarbreoch, Dalbeattie, Dumfriesshire; sire, "Young Conqueror;" dam, "Darling," by "Tintoch."

Robert Andrew, Allan's Farm, Paisley, Renfrewshire: **Second Prize**, 20*l.*, for his black; bred by Mr. Henderson, Netherton, Langbank, Renfrewshire; sire, "Defiance;" dam, "Bell," by "Sir William Wallace."

Lord Polworth, Mertown House, St. Boswell's, Berwickshire: **Third Prize**, 10*l.*, for "Harden," bay; bred by himself; sire, "The British Empire;" dam, "Peak," by "Tints."

David Riddell, Blackhall, Paisley, Renfrewshire: the *Reserve Number*, to "King-o'-Scots," bright bay; bred by Mr. McTear, Ladylands, Dumfries; sire, "Prince of Clydesdale;" dam by "Byron."

*Clydesdale Stallions—One Year-old.**

Her Majesty the Queen, Windsor Castle: **First Prize**, 15*l.*, for "Prince George of Wales," bay; bred by Mr. L. Drew, Merryton, Hamilton, Lanarkshire; sire, "Prince of Wales;" dam, "Sally," by "Sir Walter Scott."

Suffolk Stallions foaled before the 1st of January, 1875.

Richard Garrett, Carleton Hall, Saxmundham, Suffolk: **First Prize**, 50*l.*, for "Cupbearer the 3rd," chestnut, 5 years-old; bred by Mr. C. Frost, Wherstead, Ipswich, Suffolk; sire, "Cupbearer the 2nd;" dam "Nonsuch," by "Sir Colin."

Horace Wolton, The Hall, Newbourn, Woodbridge, Suffolk: Second Prize, 20*l.*, for "Royalty," bright chestnut, 6 years-old; bred by himself; sire, "Magnum Bonum;" dam, "Duchess," by "Warrior."

Manfred Biddell, Playford, Ipswich, Suffolk: Third Prize, 10*l.*, for "Ben," chestnut, 3 years-old; bred by Mr. Ashwell, Falkenham, Ipswich; sire, "Captain Snap;" dam, "Doughty," by "Farmer."

Richard Garrett, Carleton Hall: the *Reserve Number*, to "Viceroy," chestnut, 4 years-old; bred by himself; sire, Wolton's "Monarch;" dam, "Brag," by Sexton's "Chelmsford Champion."

Suffolk Stallions—Two Years-old.

Samuel Wolton, Butley Abbey, Wickham Market, Suffolk: First Prize, 50*l.*, for his chestnut, bred by Mr. Bone, Malesford Farm, Wickham Market, Suffolk; sire, "Carleton;" dam by Cottingham's "Talbot."

William Toller, Gedrave, Wickham Market, Suffolk: Second Prize, 20*l.*, for "Robin Hood," chestnut; bred by Mr. Wainwright, Bramford, Ipswich, Suffolk; sire, Catchpole's "Prince."

Champion Prize, of 100 *Guineas, for the best Agricultural or Cart Stallion in the above Classes, given by the Mayor of Liverpool.*

The Earl of Ellesmere, for "Young Samson."

John Thompson, the *Reserve Number*, to "Lord Salisbury."

Thoroughbred Stallions suitable for getting Hunters.

Thomas Gee, Dewhurst Lodge, Wadhurst, Sussex: First Prize, 100*l.*, for "Citadel," chestnut, 18 years-old; bred by the Earl of Derby, Knowsley, Lancashire; sire, "Stockwell;" dam, "Sortie," by "Melbourne."

Frederick Barlow, Hasketon, Woodbridge, Suffolk: Second Prize, 25*l.*, for "The Gunner," chestnut, 6 years-old; bred by Sir L. Newman, Exmouth, Devonshire; sire, "Crater;" dam "Doubleshot," by "Stockwell."

Robert Howard Hutton, 5, Upper Berkeley Street, Portman Square, London: Third Prize, 10*l.*, for "Laughing Stock," bay, 18 years-old; bred by Sir Charles Monck; sire, "Stockwell;" dam, "Gaiety," by "Touchstone."

Henry William Freeman, Newbridge Hill Stud Farm, Bath: the *Reserve Number*, to "Claudius," bay, 10 years-old; bred by Mr. C. Snewing, Holywell Stud Farm, Rugby, Warwickshire; sire, "Caractacus;" dam, "Lady Peel," by "Orlando."

Stallions suitable for getting Hackneys.

The Stand Stud Company, Stand, Whitefield, Manchester: First Prize, 25*l.*, for "Star of the East," chestnut, 5 years-old; bred by Mr. Cook, Thixendale, Yorkshire; sire, "Charley Merrylegs;" dam by "North Star."

Henry Roundell, Black Horse Hotel, Otley, Yorkshire: Second Prize, 15*l.*, for "Sir George Wombwell," brown, 5 years-old; bred by Mr. J. Yeadon, Fewston, Otley; sire, "Sir George;" dam by "Matchless Merrylegs" or "Grey Atlas."

The Stand Stud Company: Third Prize, 5*l.*, for "Little Wonder," bay, 6 years old; bred by Mr. Staniland, St. Neots; sire, "Royal Oak;" dam by "Rochester."

Benjamin Balderston, Mount Pleasant, Boston, Lincolnshire: the *Reserve Number*, to "Norfolk Hero," dark brown, 10 years-old; bred by Mr. Mason, Wereham, Norfolk; sire, "Perfection."

Pony Stallions, not less than 13 *hands* 2 *inches and under* 14 *hands* 2 *inches.*

Christopher W. Wilson, High Park, Kendal, Westmoreland: First Prize, 25*l.*, for "Sir George," brown, 10 years-old; bred by Mr. W. Walker, Shadwell, Yorkshire; sire, "Sportsman."

Frederick Barlow, Hasketon, Woodbridge, Suffolk: Second Prize, 15*l.*, for "Gold Star," red roan, 3 years-old; bred by himself; sire, "Silver Star;" dam by "Confidence."

Richard Marshall, Keyingham, Hull: Third Prize, 5*l.*, for "Prince Charming," dark brown, 2 years-old; bred by Mr. R. Tennison, Manor House, Hollym, Withernsea, Hull; sire, "Lord Derby the Second;" dam by "Fireaway."

Henry Bultitaft, Bedwell Hay, Ely, Cambridgeshire: the *Reserve Number*, to "Le Beau," brown, 7 years-old; bred by Mr. Foulkes, Norlington, Mildenhall, Suffolk; sire, "Clear-the-Way;" dam by "Fireaway."

Pony Stallions under 13 *hands* 2 *inches.**

Christopher W. Wilson, High Park, Kendal, Westmoreland: First Prize, 15*l.*, for "George 2nd," bay, 3 years-old; bred by himself; sire, "Sir George;" dam, "Lady Mary."

T. E. Blundell, Hill, Rugby, Stockton, Warwickshire: Second Prize, 10*l.*, for "Black Prince," black, 7 years-old; breeder unknown.

John Rees, Llanboidy, Whitland, R. S. O., Carmarthenshire: Third Prize, 5*l.*, for "Cymro Bach," dark brown, 7 years-old; bred by Mr. B. Davies, Arch, Narberth Road, Pembrokeshire.

Alexander Baird, Urie, Stonehaven, Kincardine: the *Reserve Number*, to "Fireworks," light chestnut, 5 years-old; bred by himself.

Agricultural Mares and Foals.

The Earl of Ellesmere, Worsley Hall, Manchester: First Prize, 30*l.*, for "Honest Lady," bay, 8 years-old (foal by "Young Samson"); bred by Mr. Flintham, Somersham; sire, "Honest Tom."

Thomas Horrocks Miller, Singleton Park, Poulton-le-Fylde, Lancashire: Second Prize, 20*l.*, for "Princess of Wales," bay, 5 years-old (foal by "Honest Tom"); bred by Mr. E. Parkinson, Forton, Lancaster; sire, "King Alfred;" dam, "Bessie," by "Tom-o'-the-Gills."

The Earl of Ellesmere, Worsley Hall, Manchester: Third Prize, 10*l.*, for "Honest Princess," bay, 6 years-old (foal by "Young Waggoner"); bred by Mr. W. Frohock, Willingham, St. Ives; sire, "Honest Tom;" dam by "Young Captain."

Major Henry Platt, Gorddinog, Bangor, Carnarvonshire: the *Reserve Number*, to "Jessie," grey, 5 years-old (foal by "Come Again"); bred by Mr. Stark, Camelon, Perthshire.

Clydesdale Mares and Foals.

John Thompson, Baillieknowe, Kelso, Roxburghshire: First Prize, 30*l.*, for "Kelso Maggie," light brown, 4 years-old (foal by "Prince of Wales"); bred by Mr. G. C. Symington, Kirkcarswell, Castle Douglas, Kirkcudbright; sire, "Victor."

Lawrence Drew, Merryton, Hamilton, Lanark: **Second Prize**, 20*l.*, for "Princess," brown, 7 years-old (foal by "Old Times"); bred by Mr. J. N. Fleming, Keil Farm, Campbeltown, Argyleshire; sire, "Prince of Wales;" dam, "Rosie," by "Kenmuir."

The Earl of Ellesmere, Worsley Hall, Manchester: the *Reserve Number*, to "Mrs. Muir," bay, 11 years-old (foal by "Honest Tom"); bred by Mr. Muir, Loch Fergus, Kirkcudbright; sire, "Champion;" dam, Mr. Muir's "Clydesdale Mare."

Suffolk Mares and Foals.

Horace Wolton, The Hall, Newbourn, Woodbridge, Suffolk: **First Prize**, 30*l.*, for "Newbourn Pride," chestnut, 9 years-old (foal by "Cupbearer 2nd"); bred by the late Mr. S. Wolton, the Hall, Newbourn; sire, "Wolton's Monarch;" dam, "Wolton's Pride."

Manfred Biddell, Playford, Ipswich, Suffolk: **Second Prize**, 20*l.*, for "Pride," chestnut, 7 years-old (foal by "Champion"); bred by himself; sire, "Abbot;" dam by "Conqueror."

Horace Wolton, The Hall, Newbourn: **Third Prize**, 10*l.*, for "Royal Diamond," chestnut, 13 years-old (foal by "Cupbearer 2nd"); bred by the late Mr. S. Wolton; sire, ".Warrior; dam, Wolton's "Abbey," by Catlin's "Royal Duke."

Earl Howe, Gopsall Hall, Atherstone: the *Reserve Number*, to "Scot," chestnut, 14 years-old (foal by "Brown George"); breeder unknown; sire, Walker's "Captain," dam, "Doughty."

*Agricultural or Cart Mares and Foals.**

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 15*l.*, for "Flora," brown, 4 years-old (foal by "Honest John") bred by Mrs. Millhouse, Sketchely Hall, Hinckley; sire, "A 1;" dam "Duchess," by "Black Legs."

Lawrence Drew, Merryton, Hamilton, Lanark: **Second Prize**, 10*l.*, for "Mettle," brown, 7 years-old (foal by "Prince of Wales"); bred by Mr. Ward, Snakehall, Spalding.

The Earl of Ellesmere, Worsley Hall: **Third Prize**, 5*l.*, for "Bonny," brown, 8 years-old (foal by "England's Glory"); bred by Mr. Morton, March; sire, "Honest Tom."

George Frederick Statter, Park House, Whitefield, Lancashire: the *Reserve Number*, to "Blossom," bay, 4 years-old (foal by "King Tom"); breeder unknown; sire, "Black Prince;" dam by "Honest Tom."

Agricultural Fillies—Three Years-old.

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 20*l.*, for "Lady Worsley," bay; bred by Mr. W. Fullard, Thorney, Peterborough; sire, Wiseman's "Wonder."

James Jackson, Height o' th' Hill, Stalmine, Poulton-le-Fylde, Lancashire: **Second Prize**, 10*l.*, for "Brock," chestnut; bred by Mr. J. H. Wainman, Stalmine Hall Farm; sire, "Sir Collin;" dam, "Brock," by "Short Legs."

Lawrence Drew, Merryton, Hamilton, Lanark: **Third Prize**, 5*l.*, for "Beatrice," black; bred by Mr. Smith, Ulverstone, Breaston, Derby; sire, "Lincolnshire Lad."

Lawrence Drew: the *Reserve Number*, to "Florence," brown; breeder unknown.

Clydesdale Fillies—Three Years-old.

James McQueen, Crofts, Dalbeattie, N.B.: First Prize, 20*l.*, for "Darling," light bay; bred by Mr. R. Mitchell, Christlach Farm, Campbeltown, Argyleshire; sire, "Marquis of Lorne;" dam "Blossom," by "Larg's Jock."

The Duchess of Hamilton, Easton Park, Wickham Market, Suffolk; Second Prize, 10*l.*, for "Kate," brown; bred by Mr. Lawrence Drew, Merryton; sire, "Prince of Wales;" dam, "Kate," by "Lothian Tam."

William Drewitt, Lea Farm, Bramley, Guildford, Surrey: Third Prize, 5*l.*, for "Rose of England," bay; bred by Messrs. E. and A. Stanford, Eatons, Steyning, Sussex; sire, "The Duke;" dam, "Venture," by "Napoleon."

Robert Bruce, Manor House, Great Smeaton, Northallerton: the *Reserve Number*, to "The Lady of the Lea," bay; bred by Mr. J. Lawrence, Forres Mills, Forres, Moray, N.B.; sire, "Prince of Kilbride;" dam, "Lilly."

Suffolk Fillies—Three Years-old.

James Toller, Blaxall, Wickham Market: First Prize, 20*l.*, for "Pearl," chestnut; bred by Mr. Lines, Ufford, Woodbridge; sire, Grout's "Emperor;" dam by Barthrop's "Hero."

Agricultural Fillies—Two Years-old.

Lawrence Drew, Merryton, Hamilton, Lanark: First Prize, 20*l.*, for "Lavinia," black; breeder unknown.

Charles Marsters, Saddlebow, King's Lynn, Norfolk: Second Prize, 10*l.*, for "Marshland Princess," grey; bred by Mr. Handley, Walpole Farm, King's Lynn; sire, "England's Wonder."

Thomas Horrocks Miller, Singleton Park, Poulton-le-Fylde, Lancashire: Third Prize, 5*l.*, for "Fatima," bay; bred by himself; sire, "Honest Tom;" dam, "Brisk."

The Earl of Ellesmere, Worsley Hall: the *Reserve Number*, to "Miss Linton," bay; bred by Mr. J. Linton, Westwick Hall, Cambridgeshire; sire, "Honest John."

Clydesdale Fillies—Two Years-old.

Richard Tweedie, The Forest, Catterick, Yorkshire: First Prize, 20*l.*, for "Mettle," bay; bred by himself; sire, "Tam O'Shanter;" dam, "Comely," by "Clydesdale Tom."

Lawrence Drew, Merryton, Hamilton, Lanark: Second Prize, 10*l.*, for "Jemima," brown; bred by Mr. Knox, Foreside, Neilston, Renfrew; sire, "Lord Lyon;" dam by "Prince Alfred."

David McIntosh, Havering Park, Romford, Essex: Third Prize, 5*l.*, for "Violet 2nd," bay; bred by himself; sire, "Royal Windsor;" dam by "Young Champion."

Christopher W. Wilson, High Park, Kendal, Westmoreland: the *Reserve Number*, to "Highland Mary," bay; bred by himself; sire, "Black Prince;" dam, "Lady" by "Larg's Jock."

Suffolk Fillies—Two Years-old.

Robert Capon, Dennington Lodge, Wickham Market, Suffolk: First Prize, 20*l.*, for "Matchet the 2nd," chestnut; bred by himself; sire, R. Capon's "Conqueror;" dam, "Brag," by T. Capon's "Conqueror."

Mares and Foals, suitable for breeding Hunters.

George Frederick Statter, Park House, Whitefield, Lancashire: First Prize, 30*l.*, for "Lady Lyne," brown, 18 years-old (foal by "Promised Land"); bred by the late Sir George Cholmley; sire, "Codrington;" dam, "Tipsy," by "Yaxley."

Benjamin Bee, Bullsnape Hall, Goosnargh, Preston, Lancashire: Second Prize, 20*l.*, for "Tidy," brown, 8 years-old (foal by "Rescue"); bred by himself; sire, "Sir Harry;" dam, "Bony," by "Hercules."

Ralph Brocklebank, Jun., Childwall Hall, Liverpool: Third Prize, 10*l.*, for "Sweetheart," bay, about 18 years-old; bred by himself (foal by "New Oswestry"); dam by "Greatheart."

Edmund Peel, Brynypys, Rhuabon, North Wales: the *Reserve Number*, to "Gipsy," brown, 9 years-old (foal by "Brown Bread"); breeder unknown; sire, "Progress;" dam by "Old Taxley."

Mares and Foals, suitable for breeding Hackneys.

Aquila Kirby, High Grange, Market Weighton, Yorkshire: First Prize, 20*l.*, for "Nelly," bay, 8 years-old (foal by "Prime Minister"); bred by himself; sire, "Achilles;" dam by "Melbourne."

The Stand Stud Company, Stand, Whitefield, Manchester: Second Prize, 10*l.*, for "Miss Polly," bay, 10 years-old (foal by "Perseverance"); bred by Mr. Morrell, Hellaby Hall, Rotherham, Yorkshire; sire, "Achilles."

Henry J. Bailey, Rosedale, Tenbury, Herefordshire: Third Prize, 5*l.*, for "Sybil," brown, aged (foal by "Double X"); breeder unknown.

Alexander Sherratt, Oclepitchard, Hereford: the *Reserve Number*, to "Polly," dark chestnut, 18 years-old (foal by "Truant"); bred by Rev. C. L. Eagles, Longtown, Herefordshire; sire, "Hereford;" dam, "Fanny."

Pony Mares and Foals, not less than 13 *hands* 2 *inches, and not exceeding* 14 *hands* 2 *inches.*

Benjamin Gill, Round Oak, Brierley Hill, Staffordshire: First Prize, 15*l.*, for "Pet," chestnut, 8 years-old (foal by "Quicksilver"); bred by Mr. D. Miller, Chawn-hill Farm, Stourbridge.

Richard Younge Gledhill, Park Road, Bradford, Yorkshire: Second Prize, 10*l.*, for "Lady Downs," bay, 7 years-old (foal by "Cannon-ball"); breeder unknown; sire, "Alchymist."

John Torr, M.P., Aylesby Manor, Great Grimsby, Lincolnshire: Third Prize, 5*l.*, for "Lady Godiva," bay, 23 years-old (foal by "Trent"); bred by the late Mr. Wm. Torr, Aylesby Manor; sire, "Bobby;" dam by "Auram."

George Moore Dixon, Bradley Hall, Ashbourne: the *Reserve Number*, to "Mona," grey, 14 years-old (foal by "Young Pretender"); breeder unknown.

Pairs of Agricultural or Cart Mares or Geldings, not less than 16 *hands.**

WILLIAM BRAMLEY, Amcotts Villa, Doncaster: FIRST PRIZE, 30*l.*, for "The General," bay gelding, 5 years-old, and "Boxer," brown gelding, 6 years-old; breeders unknown.

LAWRENCE DREW, Merryton, Hamilton, Lanark: SECOND PRIZE, 15*l.*, for his chestnut mare, 6 years-old, and grey mare, 7 years-old; breeders unknown.

CHARLES WILLIAM BRIERLEY, Drinkwater Park, Prestwich, Manchester: THIRD PRIZE, 10*l.*, for "Drayman," bay gelding, 6 years-old, bred by the late Mr. T. Rose, Ash Farm, Derby; and "Dick," chestnut gelding, 8 years-old; bred by Mr. T. Wall, Woolaston, Stourbridge, Derby.

EDWARD HUMPHRIES, Mount Pleasant Hall, Pershore, Worcestershire: the *Reserve Number*, to "Champion," grey gelding, 6 years-old, bred by Mr. R. Berkley, Church Hill Wood, Spetchley, Worcester; sire, "A 1;" dam, "Bonny;" and "Brown Prince," brown gelding, 6 years-old; breeder unknown; sire, "Nonpareil."

Pairs of Agricultural or Cart Mares or Geldings, under 16 *hands.**

CHRISTOPHER W. WILSON, High Park, Kendal, Westmoreland: FIRST PRIZE, 30*l.*, for "Fanny," dark bay mare, 7 years-old, and "Maggie," light bay mare, 6 years-old: breeders unknown.

THE STAND STUD COMPANY, Stand, Whitefield, Manchester: SECOND PRIZE, 15*l.*, for "Brown Bess," brown mare, 9 years-old, and "Bessie Brown," brown mare, 10 years-old: bred by Mr. Lindsey, Roach Bank, Bury, Lancashire; sire, "True Briton."

THE MAYOR, ALDERMEN, AND BURGESSES OF LIVERPOOL, Municipal Offices, Liverpool: THIRD PRIZE, 10*l.*, for "Rebecca," brown mare, 11 years-old, breeder unknown; and "The Abbot," bay gelding, 9 years-old; bred by Mr. Hodgkinson, Kirkby Hardwick, Mansfield.

*Agricultural or Cart Mares or Geldings, not less than Five Years-old.**

CHARLES BEART, Stow-Bardolph, Downham Market, Norfolk: FIRST PRIZE, 20*l.*, for "Lioness," chestnut mare, 5 years-old; bred by Mr. W. Bryan Morris, Gore's Farm, Thorney, Cambridgeshire; sire, "Nonpareil."

THE EARL OF ELLESMERE, Worsley Hall, Manchester: SECOND PRIZE, 10*l.*, for "Honest Lass," bay mare, 7 years-old; bred by Mr. L. Curtis, Chatteris, Cambridgeshire; sire, "Honest Tom;" dam, "Pink."

THE EARL OF ELLESMERE, Worsley Hall: THIRD PRIZE, 5*l.*, for "Dainty," bay mare, 9 years-old; bred by Mr. W. Beard, Chatteris, Cambridgeshire; sire, Fison's "England's Glory;" dam by Steward's "Major."

JAMES FIRTH CROWTHER, Knowl Grove, Mirfield, Yorkshire: the *Reserve Number*, to "Yorkshire Princess," brown mare, 9 years-old; bred by Mr. L. Tomlinson, Hemingbrough, Selby, Yorkshire; sire, "Oxford."

Agricultural or Cart Mares or Geldings—Four Years-old, not exceeding 16 *hands.**

LAWRENCE DREW, Merryton, Hamilton, N.B.: FIRST PRIZE, 15*l.*, for "Countess," brown mare; bred by Mr. Hawksworth, near Derby; sire, "Lofty."

THE EARL OF ELLESMERE, Worsley Hall, Manchester: SECOND PRIZE, 10*l.*, for "Ploughboy," bay gelding; bred by Mr. J. Brown, Coldham Hall, Wisbeach; sire, "Farmer's Friend;" dam by "Thumper."

HENRY SMITH, The Grove, Cropwell Butler, Bingham, Nottinghamshire: the *Reserve Number*, to "The Major," dark chestnut gelding; bred by Mr. J. B. Smith, Sawley, Derby; sire, "Lincolnshire Lad;" dam, "Jewel," by "Styche's Champion."

*Agricultural or Cart Geldings—Two Years-old.**

HENRY SMITH, The Grove, Cropwell Butler: FIRST PRIZE, 15*l.*, for "Governor," red roan; bred by Mr. J. Gilbert, Sibbertoft, Market Harborough; sire, Manning's "Emperor;" dam, "Smiler," by Hipwell's "Plumper."

THOMAS HORROCKS MILLER, Singleton Park, Poulton-le-Fylde, Lancashire: SECOND PRIZE, 10*l.*, for "Merry Tom," roan; bred by himself; dam, "Lofty."

CHARLES WILLIAM BRIERLEY, Drinkwater Park, Prestwich, Manchester: the *Reserve Number*, to "Mischief," black; breeder unknown.

Champion Prize, Silver Cup, value 50 guineas, for the best Agricultural Cart Mare or Gelding in the Showyard. Presented by Lieutenant-Colonel Steble, J.P., ex-Mayor of Liverpool.

LAWRENCE DREW.

CHARLES BEART: the *Reserve Number*, to "Lioness."

*Hunter Mares or Geldings, up to 15 stone.**

THE DUKE OF HAMILTON, Easton Park, Wickham Market, Suffolk: FIRST PRIZE, 30*l.*, for "Winder," black gelding, 9 years-old; breeder unknown.

JOHN B. BOOTH, Killerby, Catterick, Yorkshire: SECOND PRIZE, 15*l.*, for "Baldersby," bay gelding, 6 years-old; bred by Mr. Lomas, Baldersby, Thirsk; sire, "Ainderby;" dam by "St. Bennett."

CHARLES WALFORD KELLOCK, Rough Grange, Gateacre, Lancashire: the *Reserve Number*, to "Lady Godiva," bay mare, 7 years-old; breeder unknown.

*Hunter Mares or Geldings, up to 12 stone.**

TEASDALE HILTON HUTCHINSON, Manor House, Catterick, Yorkshire: FIRST PRIZE, 30*l.*, for "Glengyle," chestnut gelding, 5 years-old; bred by Mr. Russell Swanwick, Royal College Farm, Cirencester, Gloucestershire; sire, "Knowsley."

FREDERICK BARLOW, Hasketon, Woodbridge, Suffolk: SECOND PRIZE, 15*l.*, for "Vandyke," bay gelding, 5 years-old; bred by Mr. G. Meynell, Wardle House, Bedale; sire, "Van Galen;" dam by "Barnton."

JOHN G. LITTLE, Penrith, Cumberland: THIRD PRIZE, 10*l.*, for "Sall," bay mare, 5 years-old; bred by Mr. William Bell, Norton, Penrith; sire, "Kingfisher;" dam, Fanny," by "Charley Boy."

GEORGE WARREN, Beconsfield Road, Woolton, Liverpool: the *Reserve Number*, to "Polly," chestnut mare, about 6 years-old; bred by Mr. Joel Dean, Bebbington, Cheshire; sire, "Abergeldie;" dam, "Polly."

Hunter Mares or Geldings—Four Years-old.

FOORD PRESTON NEWTON, Norton Cottage, Malton, Yorkshire: FIRST PRIZE, 30*l.*, for "Sir George," bay gelding; breeder unknown; sire, "Theobald;" dam by "Orpheus."

James Moffat, Crosby-on-Eden, Carlisle, Cumberland: **Second Prize**, 15*l.*, for "Rosalind," brown mare; bred by Mr. J. W. R. Piper, Alstonby, Carlisle, Cumberland; sire, "Laughing Stock;" dam, "Lady Lyne," by "Codrington."

Herbert Rouse, Burley House, Burley-in-Wharfdale, Yorkshire: **Third Prize**, 10*l.*, for "Bellona," grey mare; bred by Mr. Thompson, Sheriff Hutton, Park, Yorkshire; sire, "King Caradoc;" dam, "Necromancer."

John Rickerby, Wall Head, Carlisle: the *Reserve Number*, to "Captain," chestnut gelding; bred by himself; sire, "Laughing Stock;" dam, "Bonnie Kate," by "Clansman."

Hunter Mares or Geldings—Three Years-old.

The Duke of Hamilton, Easton Park, Wickham Market, Suffolk: **First Prize**, 20*l.*, for "Boynton," bay gelding; bred by the late Sir George Cholmley, Bart., Boynton, Bridlington; sire, "The Baron;" dam, "Pully-Hauley," by "King Caradoc."

John Rickerby, Wall Head, Carlisle: **Second Prize**, 10*l.*, for "Young Kate," chestnut mare; bred by himself; sire, "Laughing Stock;" dam, "Bonnie Kate," by "Clansman."

Thomas Horrocks Miller, Singleton Park, Poulton-le-Fylde, Lancashire; **Third Prize**, 5*l.*, for "Carbine," bay gelding; bred by himself; sire, "Carbineer;" dam, "Goldfinch," by "Sir Colin."

John Jackson Banks, Lanefoot, Kendal, Westmoreland: the *Reserve Number*, to "Rural Dean," chestnut gelding; bred by himself; sire, "The Dean;" dam, "Rosette," by "Harkaway."

Hackney Mares or Geldings, 15 *hands, up to not less than* 12 *stone.**

The Stand Stud Company, Stand, Whitefield, Manchester: **First Prize**, 15*l.*, for "Silvertail," bay gelding, 5 years-old; breeder unknown.

John Castlehow Toppin, Musgrave Hall, Skelton, Cumberland: **Second Prize**, 10*l.*, for "Major," bay gelding, 4 years-old; bred by Mrs. Bowerbank, Greystoke, Cumberland; sire, "Laughing Stock."

William Walls Townson, Hotham Street, Liverpool: **Third Prize**, 5*l.*, for his dark chestnut gelding, 5 years-old; breeder unknown.

James Turvey, Southport, Lancashire: the *Reserve Number*, to "Peggy," bay mare, 6 years-old; bred by Mr. J. Woodcock, Mere Brow; sire, "Old Times."

Hackney Mares or Geldings, 15 *hands, up to not less than* 15 *stone.**

The Stand Stud Company, Stand, Whitefield, Manchester: **First Prize**, 15*l.*, for "Surprise," bay mare, 8 years-old; breeder unknown.

David Carlyle, The Crescent, Carlisle, Cumberland: **Second Prize**, 10*l.*, for "The Colonel," black-brown gelding, 7 years-old; bred by himself; sire, "Laughing Stock;" dam, "Bess."

Hackney Mares or Geldings, above 14 *and not exceeding* 15 *hands, up to* 12 *stone.*

John Robinson, Clyde Terrace, Hessle Road, Hull; **First Prize**, 15*l.*, for "Charles the Second," dark chestnut gelding, 6 years-old; bred by Mr. Mager, Sledmere, Yorkshire; sire, "Denmark;" dam, "Fireaway," by "Old Merry Legs."

Alfred Woodhead, Hale, Bowdon, Cheshire: **Second Prize**, 10*l.*, for "Kathleen," grey mare, aged; breeder unknown.

Joseph Cooper Rogerson, Oldham-Street, Manchester: **Third Prize**, 5*l.*, for "Lady Sybella," bay mare, 6 years-old; bred by Mr. Scriven, Ottley, Yorkshire; sire, "Trippet's Fireaway;" dam by "Flying Buck."

Richard Wright, Holmfield, Whalley Range, Manchester: the *Reserve Number*, to "Princess," bay mare, 4 years-old; breeder unknown.

Hacks or Roadsters, above 14 *and not exceeding* 15 *hands, up to* 15 *stone.*

The Stand Stud Company, Stand, Whitefield, Manchester: **First Prize**, 15*l.*, for "King of the Fairies," chestnut gelding, 6 years-old; breeder unknown.

Pony Mares or Geldings, above 13 *and not exceeding* 14 *hands.**

The Duke of Hamilton, Easton Park, Wickham Market, Suffolk: **First Prize**, 15*l.* for "Bosco," black gelding, 7 years-old; breeder unknown.

Ellis Mather, Finch House, West Derby, Liverpool: **Second Prize**, 10*l*, for "Charlie," black gelding, 4 years-old; breeder unknown.

John Castlehow Toppin, Musgrave Hall, Skelton, Cumberland: **Third Prize**, 5*l.*, for "Fairy Queen," chestnut mare, 4 years-old; bred by Mrs. Bell, Penrith; sire, "British Monk."

Myles Edward Mather, Percy Lodge, Leamington, Warwickshire: the *Reserve Number*, to "Daphne," black mare, 9 years-old; bred by the Rev. T. Williams, Northop, Flints.

Pony Mares or Geldings, not exceeding 13 *hands.**

Robert Vicars Mather, Southport, Lancashire: **First Prize**, 15*l.*, for "Rex," dun gelding, 8 years-old; breeder unknown.

John Carr, Leyland, Lancashire: **Second Prize**, 10*l.*, for "Welsh Girl," dun mare, 5 years-old; breeder unknown.

Elizabeth Ann Richards, Clifton Lodge, Preston, Lancashire: **Third Prize**, 5*l.*, for "Gipsy," bay mare, 8 years-old; breeder unknown.

Alfred Ashton, Parkfield, Middleton, Lancashire: the *Reserve Number*, to "Tommy," dark brown gelding, aged; breeder unknown.

CATTLE.

Shorthorn Bulls above Three Years-old.

William Linton, Sheriff Hutton, York: **First Prize**, 30*l.*, for "Sir Arthur Ingram" (32,490), roan, 5 years, 5 months, 6 days-old; bred by himself; sire "Serjeant-Major" (29,957); dam, "Fragrance," by "Mountain Chief" (20,383); g. d., "Miss Topsy," by "Blood Royal" (17,423); gr. g. d., "Yorkshire Lass," by "Magnus Troil" (14,880); gr. g. g. d., "Beauty," by "Bates" (12,450).

The Marquis of Exeter, Burghley Park, Stamford: **Second Prize**, 20*l.*, for "Telemachus 6th" (35,725), roan, 4 years, 6 months, 2 weeks, 2 days-old; bred by himself; sire, "Telemachus" (27,603); dam, "Sea Gull," by "Nestor" (24,648); gr. d., "Petrel," by "4th Duke of Thorndale" (17,750); gr. g. d., "Sandpiper," by "The Briar" (15,376); gr. g. g. d., "Water Wagtail," by "Francisco" (12,893).

Thomas Atkinson, Higher House, Unsworth, Manchester: **Third Prize**, 15*l.*, for "Sergeant Irwin," red and white, 4 years, 3 months, 2 weeks, 3 days-old; bred by Mr. W. Linton, Sheriff Hutton, York; sire, "Serjeant-Major" (29,987); dam, "Home Beauty," by "Mountain Chief" (20,383); g. d., "Handmaid," by "Magnus Troil" (14,880); gr. g. d., "White Rose," by "Magnus Troil" (14,880); gr. g. g. d., "Eliza," by "Bates" (12,451).

William Alexander Mitchell, Auchnagathle, Whitehouse, Aberdeenshire: **Fourth Prize**, 10*l.*, for "Duke of Chamburgh" (36,052), roan, 3 years, 10 months, 2 weeks, 6 days-old; bred by Mr. John Outhwaite, Bainesse, Catterick, Yorkshire; sire, "Royal Windsor" (29,890); dam, "White Socks," by "Baron Killerly" (27,949); g. d., "Bertha," by "Welcome Guest" (15,407); gr. g. d. by "Vanguard" (10,994).

I. and J. Gaitskell, Hall Santon, Holmrook, Cumberland: the *Reserve Number*, to "Rambler" (35,202); white, 3 years, 5 months, 1 week, 6 days-old; bred by themselves; sire, "King James" (28,972); dam, "Illustrious Lady," by "Puff" (27,219); g. d., "Illustrious," by "Master Gwynne" (16,539); gr. g. d., "Iris," by "Usurper" (12,251); gr. g. g. d., "I. X. L.," by "U. X. L." (9764).

Shorthorn Bulls above Two and not exceeding Three Years-old.

The Duke of Northumberland, Alnwick Castle, Northumberland: **First Prize**, 25*l.*, for "Snowstorm," white, 2 years, 8 months, 2 weeks, 6 days-old; bred by himself; sire, "Mayor of Windsor" (31,897); dam, "Snowdrop," by "Ace of Trumps" (30,355); g. d., "Woodbine," by "Vice-President" (23,125); gr. g. d., "Rosebud," by "Majestic" (13,279); gr. g. g. d., "Nancy," by "George 3rd" (16,147).

Thomas Willis, Manor House, Carperby, Bedale, Yorkshire: **Second Prize**, 15*l.*, for "Rear-Admiral" (27,310), roan, 2 years, 3 weeks, 2 days-old; bred by himself; sire, "Admiral Windsor" (32,912); dam, "Windsor's Hyacinth," by "Windsor's Prince" (32,164); g. d., "Camelia Windsor," by "Windsor Fitz-Windsor" (25,458); gr. g. d., "Camelia," by "Royal Alfred" (18,748); gr. g. g. d., "Mayflower," by "Knight of the Garter" (13,124).

Francis J. Savile Foljambe, M.P., Osberton Hall, Worksop, Notts: **Third Prize**, 10*l.*, for "Lavangro" (36,887), red, 2 years, 4 months, 1 week, 1 day-old; bred by himself; sire, "M.P." (29,398); dam, "Zingari," by "Knight of the Crescent" (26,547); g. d., "Zinganee," by "Knight of the Garter" (22,062); gr. g. d., "Gipsy Queen," by "Imperial Windsor" (18,086); gr. g. g. d. "Sybil," by "May Duke" (16,553).

Thomas Hardwick Bland, Dingley Grange, Market Harborough: **Fourth Prize**, 5*l.*, for "General Fusee" (36,681), roan, 2 years, 11 months, 5 days-old; bred by himself; sire, "Earl of Waterloo 2nd" (33,819); dam, "Fairy," by "African" (36,104); g. d., "Beauty," by "Harry" (36,743); gr. g. d., "Miss Pittam 2nd," by "Castle Ashby" (36,327); gr. g. g. d., "Miss Pittam 1st," by "Carminta" (7877).

William Linton, Sheriff Hutton, York: the *Reserve Number*, to "Sir Hugo Irwin," red and white, 2 years, 6 months, 1 week, 2 days-old; bred by himself; sire, "Sir Arthur Ingram" (32,490); dam, "Fanny," by "Serjeant-Major" (29,957); g. d., "Louise," by "White Windsor" (27,803); gr. g. d., "Mushroom," by "Earl Windsor" (17,788); gr. g. g. d., "Beauty 2nd," by "Magnus Troil" (14,880).

Shorthorn Yearling Bulls above One and not exceeding Two Years-old.

JOHN TORR, M.P., Aylesby Manor, Grimsby, Lincolnshire: FIRST PRIZE, 25*l.*, for "FitzWilliam," white, 1 year, 11 months, 4 weeks, 1 day-old; bred by himself; sire, "Knight of the Shire" (26,552); dam, "Heather Flower," by "Lord Napier" (26,688); g. d., "Highland Flower," by "Mountain Chief" (20,383); gr. g. d., "Clarence Flower," by "Fitz-Clarence" (14,552); gr. g. g. d., "British Flower," by "British Prince" (14,197).

WILLIAM TENNANT, White House, Barlow, Selby, Yorkshire: SECOND PRIZE, 15*l.*, for "Kalamazoo," red and white, 1 year, 6 months, 4 weeks-old; bred by himself; sire, "Sir Arthur Ingram" (32,490); dam, "Parting Rose," by "Cambridge Duke 4th" (25,706); g. d., "Prima Donna," by "Waverley 4th" (21,084); gr. g. d., "Pomp," by "Sir John" (12,084); gr. g. g. d., "Priscilla," by "The Bonus" (10,922).

FRANCIS J. SAVILE FOLJAMBE, M.P., Osberton Hall, Worksop: THIRD PRIZE, 10*l.*, for "Flag of France," white, 1 year, 3 months, 1 week, 6 days-old; bred by himself; sire, "M.P." (29,398); dam, "Fleur-de-Lis," by "Lord Lyons" (26,677); g. d., "Rose of Windsor," by "Imperial Windsor" (18,086); gr. g. d., "Blanch," by "Monarch" (13,347); gr. g. g. d., "Seraph," by "Lord of Brawith" (10,465).

JOHN RELPH, Meaburn Hall, Shap, Westmoreland: FOURTH PRIZE, 5*l.*, for "Bright Duke," roan, 1 year, 1 month, 5 days-old; bred by Messrs. Dudding, Panton House, Wragby, Lincolnshire; sire, "Pluto" (35,050); dam, "Bright Duchess," by "Grand Duke 15th" (21,852); g. d., "Bright Halo," by "Breast Plate" (19,337); gr. g. d., "Bright Dew," by "British Prince" (14,197); gr. g. g. d., "Bright Morn," by "Vanguard" (10,994).

THOMAS HARDWICK BLAND, Dingley Grange, Market Harborough: the *Reserve Number*, to "General Flirt," roan, 1 year, 7 months, 3 weeks, 5 days-old; bred by himself; sire, "Earl of Waterloo 2nd" (33,819); dam, "Fairy," by "African" (36,104); g. d., "Beauty," by "Harry" (36,743); gr. g. d., "Miss Pittam 2nd," by "Castle Ashby" (36,327); gr. g. g. d., "Miss Pittam 1st," by "Carminta" (7877).

Shorthorn Bull Calves above Six and not exceeding Twelve Months-old.

THOMAS WILLIS, Manor House, Carperly, Bedale, Yorkshire: FIRST PRIZE, 20*l.*, for "Vice-Admiral," roan, 10 months, 1 week, 5 days-old; bred by himself: sire, "Admiral Windsor" (32,912); dam, "Windsor's Hyacinth," by "Windsor's Prince" (32,164); g. d., "Camelia Windsor," by "Windsor Fitz-Windsor" (25,458); gr. g. d. "Camelia," by "Royal Alfred" (18,748); gr. g. g. d., "Mayflower," by "Knight of the Garter" (13,124).

THE EARL OF FEVERSHAM, Duncombe Park, Helmsley, Yorkshire: SECOND PRIZE, 15*l.*, for "Baron Ryedale," roan, 9 months, 5 days-old; bred by himself; sire, "Winsome Duke" (36,019); dam, "Belle of Ryedale 2nd," by "Orestes" (22,443); g. d., "Belle of Bolton," by "Earl of Westmoreland" (21,662); gr. g. d., "Princess of Battersea," by "Mandarin" (18,317); gr. g. g. d., "Ballad Singer," by "Fifth Duke of Oxford" (12,762).

THE MYTTON FARMING COMPANY, Whalley, Blackburn, Lancashire: THIRD PRIZE, 10*l.*, for "Mytton Chief," white, 10 months, 2 days-old; bred by himself; sire, "Star Chieftain" (35,672); dam, "Beauty 8th," by "Prince Patrick" (16,760); g. d., "Beauty 4th," by "Richard Cœur-de-Lion" (13,590); gr. g. d., "Beauty 3rd," by Frederick" (11,489); gr. g. g. d., "Beauty," by "Victor" (8730).

Richard Stratton, The Duffryn, Newport, Monmouthshire: **Fourth Prize**, 5*l.*, for "Carbuncle," red, 8 months, 3 weeks, 5 days-old; bred by himself; sire, "Rob Roy" (29,806); dam, "Amethyst," by "Bude Light" (21,342); g. d. "Emerald," by "Young Windsor" (17,241); gr. g. d., "Etiquette," by "Tenantry" (13,829); gr. g. g. d., "Euridice," by "Red ."Duke" (8624).

Lieut.-Colonel Loyd Lindsay, V.C., M.P., Lockinge Park, Wantage, Berks: the *Reserve Number*, to "Belgrade," red, 11 months, 2 weeks-old; bred by himself; sire, "Lord Rockville" (34,658); dam, "Bella Donna," by "Lord Napier" (26,691); g. d., "Burlesque," by "Fawsley Baronet" (23,920); gr. g. d., "Britannia," by "Master Coleshill" (18,344); gr. g. g. d., "Blossom," by "Sultan" (11,847).

Shorthorn Cows above Three Years-old.

Benjamin St. John Ackers, Prinknash Park, Painswick, Gloucestershire: **First Prize**, 20*l.*, for "Queen of the Georgians," roan, 5 years, 5 months, 1 day-old, in milk; bred by himself; sire, "County Member" (28,268); dam, "Georgie's Queen," by "Brigade Major" (21,312); g. d., "Georgie," by "Prince George" (13,510); gr. g. d., "Hopeful," by "Hopewell" (10,332); gr. g. g. d. by "Warrior" (12,287).

Teasdale Hilton Hutchinson, Manor House, Catterick: **Second Prize**, 15*l.*, for "Lady Alicia," roan, 4 years, 5 months, 3 weeks, 4 days-old, in-milk and in-calf; bred by himself; sire, "King James" (28,971); dam, "Lady Alberta," by "Lord Albert" (20,143); g. d., "Lady of the Manor," by "Baron Warlaby" (7813); gr. g. d., "Lady Burton," by "Vesuvius" (5559).

The Marquis of Exeter, Burghley Park, Stamford: **Third Prize**, 10*l.*, for "Telemacina," roan, 3 years, 7 months, 1 week, 3 days-old, in milk; bred by himself; sire, "Telemachus" (27,603); dam, "Lady Penrhyn," by "Third Duke of Wharfdale" (21,619); g. d., "Nonpareil 21st," by "Duke of Geneva" (19,614); gr. g. d., "Nonpareil 20th," by "Marmaduke" (14,897); gr. g. g. d., "Nonpareil 19th," by "Matadore" (11,800).

Emily, Lady Pigot, West Hall, Weybridge, Surrey: **Fourth Prize**, 5*l.*, for "Zvezda," roan, 3 years, 9 months, 1 week, 4 days-old; in-milk and in calf; bred by herself; sire, "King James" (28,971); dam, "Lucky Star," by "Ravenspur" (20,628); g. d., "Belle Etoile," by "King Arthur" (13,110); gr. g. d., "Princess Maude," by "Prince Arthur" (13,497); gr. g. g. d., "Bustle," by "Valiant" (10,989).

Thomas Atkinson, Higher House, Unsworth, Manchester: the *Reserve Number*, to "Moonshine," roan, 4 years, 2 months, 1 week, 6 days-old, in-milk; bred by Mr. J. T. Robinson, Leckley Palace, Assenby, Thirsk; sire, "Star of Brightness" (32,604); dam, "Sunshine," by "Lord Wetherley" (24,477); g. d., "Dairymaid," by "Lord Abbot" (20,140); gr. g. d., "Milkmaid," by "Marc Antony" (14,895); gr. g. g. d., "Prolific," by "Duke of Richmond" (7996).

Shorthorn Heifers in-milk or in-calf, not exceeding Three Years-old.

Emily, Lady Pigot, West Hall, Weybridge, Surrey: **First Prize**, 20*l.*, for "Imperious Queen," light roan, 2 years, 10 months, 3 weeks, 3 days-old, in-milk and in-calf; bred by herself; sire, "Victor Rex" (30,227); dam, "Imperial Rose 2nd," by "Prince of the Empire" (20,578); g. d., "Imperial Rose," by "Prince Imperial" (15,095); gr. g. d., "Red Rose," by "Vanguard" (10,994); gr. g. g. d., "Lenny," by "Leonard" (4210).

TEASDALE HILTON HUTCHINSON, Manor House, Catterick: **SECOND PRIZE**, 15*l.*, for "Grateful," roan, 2 years, 5 months, 5 days-old, in-calf; bred by himself; sire, "M. C." (31,898); dam, "Gerty 3rd," by "Knight of the Shire" (26,552); g. d., "Gerty," by "Vain Hope" (23,102); gr. g. d., "Garland," by "Grand Master" (24,078); gr. g. g. d., "Bridget," by "Highthorn" (13,028).

JONATHAN ANGUS, Broomley, Stocksfield-on-Tyne, Northumberland: **THIRD PRIZE**, 10*l.*, for "Gaiety 3rd," roan, 2 years, 3 days-old, in-calf; bred by the Executors of Mr. G. Angus, Broomley, Stocksfield-on-Tyne; sire, "Ben Brace" (30,524); dam, "Gaiety," by "Merry Monarch" (22,349); g. d., "Rachel," by "Monarch" (18,412); gr. g. d., "Young Matchless," by "Duke of Tyne" (12,773); gr. g. g. d., "Matchless," by "Young Hector" (7074).

EMILY, LADY PIGOT, West Hall: **FOURTH PRIZE**, 5*l.*, for "Rosalba," rich roan, 2 years, 1 month-old, in-calf; bred by Mr. J. Stratton, Alton Priors, Marlborough, Wilts; sire, "Royal" (35,331); dam, "Rosette," by "James 1st" (24,202); g. d., "May Rose 2nd," by "Bude Light" (21,342); gr. g. d., "May Rose," by "Young Windsor" (17,241); gr. g. g. d., "Essence of Roses," by "His Highness" (14,708).

WILLIAM HANDLEY, Green Head, Milnthorpe, Westmoreland: the *Reserve Number*, to "Lily Windsor," white, 2 years, 6 months, 3 weeks, 3 days-old, in-calf; bred by himself; sire, "Sir Arthur Windsor" (35,541); dam, "Louisa," by "Sir Walter Trevelyan" (25,179); g. d., "Old Lavender," by "General Garibaldi" (21,813); gr. g. d., "Lady," by "Tenant Farmer" (13,828); gr. g. g. d., "Young Meteor" (13,336).

Shorthorn Yearling Heifers, above One and not exceeding Two Years-old.

RICHARD MARSH, Little Offley, Hitchin, Hertfordshire: **FIRST PRIZE**, 20*l.*, for "Diana," roan, 1 year, 10 months-old; bred by himself; sire, "Mantalini Prince" (29,273); dam, "Dahlia," by "Pan" (18,516); g. d., "Daisy," by "Noble" (14,997); gr. g. d., "Daisy," by "Earl of Chester" (9057); gr. g. g. d., "Daisy," by "Earl of Chester" (9057).

THE EARL OF ELLESMERE, Worsley Hall, Manchester: **SECOND PRIZE**, 15*l.*, for "The Lady," roan, 1 year, 9 months, 4 weeks-old; bred by the late Colonel Towneley, Towneley Park, Burnley; sire, "Second Hubback" (28,880); dam, "Lunette," by "Royal Scotforth" (25,042); g. d., "Moonbeam," by "Prince James" (20,555); gr. g. d., "Sunshine," by "Duke of Buckingham" (14,428); gr. g. g. d., "Sunbeam," by "Dandy Dinmont" (11,329).

THOMAS HARDWICK BLAND, Dingley Grange, Market-Harborough: **THIRD PRIZE**, 10*l.*, for "Brazilian Bride," roan, 1 year, 11 months, 2 days-old; bred by himself; sire, "Earl of Waterloo 2nd" (33,819); dam, "Beatrice," by "Sportsman" (25,207); g. d., "Bridecake," by "May Duke 2nd" (18,372); gr. g. d., "Blanc Mange," by "Magistrate" (13,274); gr. g. g. d., "Blanche 5th," by "Antinous" (12,401).

BENJAMIN ST. JOHN ACKERS, Prinknash Park, Painswick: **FOURTH PRIZE**, 5*l.*, for "Second Lady Carew," light roan, 1 year, 9 months, 1 week, 2 days-old; bred by himself; sire, "County Member" (28,268); dam, "Lady Jane," by "Baron Killerby" (23,364); g. d., "Miracle," by "Prince James" (20,554); gr. g. d., "Heather Bell," by "Hero" (18,055); gr. g. g. d., "Fanny," by "Rubens" (5027).

EMILY, LADY PIGOT, West Hall, Weybridge, the *Reserve Number*, to "Victoria Lucida," roan, 1 year, 5 months, 3 weeks, 4 days-old; bred by herself;

sire, "Royal Benedict" (27,348); dam, "Victoria Fulgida," by "Constellation" (28,243); g. d., "Victoria Victrix," by "Sidus" (29,969); gr. g. d., "Victoria Regia," by "British Prince" (14,197); gr. g. g. d., "Victoria," by "Hopewell" (10,332).

Shorthorn Heifer Calves, above Six and under Twelve Months-old.

ALBERT BRASSEY, Heythrop Park, Chipping-Norton, Oxfordshire: **FIRST PRIZE**, 20*l.*, for "Jemima 4th," red and white, 11 months, 3 weeks, 5 days-old; bred by himself; sire, "Parallax" (35,009); dam, "Jemima," by "Duke of Towneley" (21,615); g. d., "Jennet," by "Havelock" (14,676); gr. g. d., "Jenny Royal," by "Royal" (13,636); gr. g. g. d., "Jenny Lind," by "Fitz-Hardinge" (8073).

LORD SUDELEY, Toddington, Winchcomb, Gloucestershire: **SECOND PRIZE**, 15*l.*, for "Seraphina Bella 4th," roan, 11 months, 2 weeks, 4 days-old; bred by the late Lord Sudeley; sire, "Baron Winsome 3rd" (33,108); dam, "Booth's Seraphina," by "Baron Booth" (21,212); g. d., "Seraphina 13th," by "John O'Gaunt" (16,322); gr. g. d., "Seraphina 7th," by "Duke of Sussex" (12,772); gr. g. g. d., "Seraphina 2nd," by "Sweet William" (7571).

BENJAMIN ST. JOHN ACKERS, Prinknash Park, Painswick: **THIRD PRIZE**, 10*l.*, for "3rd Lady Carew," roan, 8 months, 3 weeks, 5 days-old; bred by himself; sire, "County Member" (28,268); dam, "Lady Jane," by "Baron Killerby" (23,364); g. d., "Miracle," by "Prince James" (20,554); gr. g. d., "Heather Bell," by "Hero" (18,055); gr. g. g. d., "Fanny," by "Rubens" (5027).

GEORGE GARNE, Churchill Heath, Chipping-Norton, Oxfordshire; **FOURTH PRIZE**, 5*l.*, for "Portrait 12th," roan, 11 months, 4 weeks-old; bred by Mr. Widdows, Stanlake, Bampton, Oxfordshire; sire, "Grand Duke of Geneva 2nd" (31,288); dam, "Patelina," by "Royal Butterfly 20th" (25,007); g. d., "Patroness," by "Cynric" (19,542); gr. g. d., "Panacea," by "General Pelissier" (14,605); gr. g. g. d., "Pane," by "Bashaw" (12,449).

THE DUKE OF NORTHUMBERLAND, Alnwick Castle: the *Reserve Number*, to "Lady Jane," roan, 9 months, 2 weeks-old; bred by himself; sire, "Fitzroland" (33,936); dam, "Janet," by "Mayor of Windsor" (31,897); g. d., "Young Dairymaid," by "Foxton" (23,979); gr. g. d., "Dairymaid," by "Melsonby" (18,380); gr. g. g. d., "Young Jessy," by "George 3rd" (16,147).

*Shorthorn Cows, and each with not less than Two of her Offspring.**

THOMAS HORROCKS MILLER, of Singleton Park, Poulton-le-Fylde, Lancashire: **FIRST PRIZE**, 50*l.*, for "Ringlet 2nd," roan, 12 years, 3 months, 1 week, 3 days-old; bred by Messrs. Atkinson, Bywell Hall Farm, Stocksfield-on-Tyne; sire, "Bywell Victor" (21,353); dam, "Ringlet," by "Lord of the Valley" (14,837); g. d., "Rose Duchess," by "Red Duke" (13,571); gr. g. d., "Red Rose," by "Vanguard" (10,994); gr. g. g. d., "Dinah," by "Diamond" (5918). And *Offspring*: Cows—"Ringlet 4th," roan, 4 years, 10 months, 3 weeks, 6 days-old; sire, "White Duke" (32,849): "Ringlet 5th," roan, 3 years, 8 months, 4 days-old; sire, "Flag of Ireland" (28,613). Bull—"Benedictine," red and white, 1 year, 5 months, 3 weeks, 3 days-old; sire, "Royal Benedict" (27,348). Cow-calf—"Ringlet 7th," red and white, 6 months, 2 weeks, 2 days-old; sire, "Braithwaite Booth" (33,192). All bred by himself.

George Ashburner, Low Hall, Kirkby Ireleth, Carnforth, Lancashire: Second Prize, 25*l.*, for "Duchess of Kirkby," roan, 7 years, 3 months, 1 week, 4 days-old; bred by himself; sire, "Grand Duke 10th" (21,848); dam, "Nightingale Oxford," by "Oxford" (20,449); g. d. "Miss Nightingale," by "Ploughboy" (15,068); gr. g. d., "Jenny Lind," by "Hope" (13042); gr. g. g. d., "Red Rose," by "Hector" (6063). And *Offspring:* Cows—"Duchess of Kirkby 2nd," white, 4 years, 8 months-old; sire, "Baron Oxford 4th" (25,580): "Duchess of Kirkby 3rd," red, 1 year, 1 month, 3 weeks, 3 days-old; sire, "Grand Duke of Lightburne 3rd" (28761). Bull—"Duke of Kirkby 3rd," roan, 2 months, 3 weeks, 2 days-old; sire, "Cherry Duke of Lightburne" (36,349). All bred by himself.

William Herbert Wodehouse, Woolmers Park, Hertford: Third Prize, 10*l.*, for "Countess," roan, 9 years, 2 months, 1 week, 1 day-old; bred by himself; sire, "Archdale" (21,183); dam, "Lily," by "Duke of Argyle" (11,375); g. d., "Cora," by "Marquis" (11,786); gr. g. d., "Countess," by "Rumour" (7456); gr. g. g. d., "Ruby," by "Irishman" (5446). And *Offspring:* Cows—"Countess of Woolmers," roan, 1 year, 5 months, 3 weeks, 2 days-old; sire, "Woolmer's Duke" (32,890): "Countess Mary," roan, 6 months, 3 weeks-old; sire, "Royal Havering 2nd" (35,375). Both bred by himself.

Henry Lovatt, Low Hill, Bushbury, Wolverhampton: the *Reserve Number*, to "Medea," roan, 5 years, 2 months, 3 weeks, 3 days-old, bred by Mr. W. Bradburn, Wednesfield, Wolverhampton; sire, "White Satin" (27,800); dam, "Princess 5th," by "Wednesfield" (30,281); g. d., "Princess 3rd," by Romagna" (29,818); gr. g. d., "Princess 2nd," by "Prince of Featherstone" (29,652); gr. g. g. d., "Princess," by "Prince of Featherstone" (29,652). And *Offspring:* White cow, 1 year, 2 months, 3 weeks, 3 days-old; sire, "Stockton" (35,685): red and white cow, 1 month, 6 days-old; sire, "Earl of Doncaster" (36,578). Both bred by himself.

Best Shorthorn Male in the Showyard.

A Silver Cup, value 50*l.*, the gift of Lord Skelmersdale, President of the Society: **William Linton**, for "Sir Arthur Ingram."

Best Shorthorn Female in the Showyard.

A Silver Cup, value 30*l.*, the gift of the Earl of Bective: **B. St. John Ackers**, for "Queen of the Georgians."

Hereford Bulls above Three Years-old.

William Taylor, Showle Court, Ledbury, Herefordshire: First Prize, 25*l.*, for "Tredegar" (5077), 4 years, 6 months, 4 weeks, 1 day-old; bred by himself; sire, "Mercury" (3967); dam, "Beauty," by "Holmer" (2043).

Thomas Thomas, St. Hilary, Cowbridge, Glamorganshire: Second Prize, 15*l.*, for "Horace 2nd," 3 years, 1 month, 3 weeks, 3 days-old; bred by Mr. J. Price, Court House, Pembridge, Herefordshire; sire, "Horace" (3877); dam, "Damsel 2nd," by "Wanderer" (5132).

Hereford Bulls above Two and not exceeding Three Years-old.

William Taylor, Showle Court, Ledbury: First Prize, 25*l.*, for "Thoughtful" (5063), 2 years, 9 months, 6 days-old; bred by himself; sire, "Mercury" (3967); dam, "Young Beauty," by "Sir Francis" (3438).

Sarah Edwards, Wintercott, Leominster, Herefordshire: **Second Prize**, 15*l.*, for "Sir Edward," 2 years, 9 months, 4 weeks-old; bred by herself; sire, "Winter de Cote" (4253); dam, "Young Meremaid 3rd," by "Leominster 3rd" (3211).

Edward Lister, Cefn Ila., Usk, Monmouthshire: **Third Prize**, 5*l.*, for "John Bull," 2 years, 4 months, 2 weeks, 2 days-old; bred by himself; sire, "Chanter" (3738); dam, "Leda," by "Chorister" (3021): and the *Reserve Number*, to "May Duke," 2 years, 4 months, 2 weeks, 1 day-old; bred by himself; sire, "Chanter" (3738); dam, "Cherry," by "Orphan" (3662).

Hereford Yearling Bulls above One and not exceeding Two Years-old.

Sarah Edwards, Wintercott, Leominster: **First Prize**, 25*l.*, for "Victor" 1 year, 11 months, 1 day-old; bred by herself; sire, "Winter de Cote" (4253); dam, "Victress," by "Son of Grove 2nd" (2556).

William Taylor, Showle Court: **Second Prize**, 15*l.*, for "Telescope," 1 year, 11 months, 1 week-old; bred by himself; sire, "Tredegar" (5077); dam, "Tulip," by "Triumph" (2836).

Thomas James Carwardine, Stockton, Bury, Leominster: **Third Prize**, 5*l.*, for "Ben Battle," 1 year, 9 months, 1 day-old; bred by himself; sire, "Longhorns" (4711); dam, "Florence," by "De Cote" (3060).

William Taylor, Showle Court: the *Reserve Number*, to "Tredegar 2nd," 1 year, 11 months, 1 week, 5 days-old; bred by himself; sire, "Tredegar" (5077); dam, "Hazel," by "Tom Brown" (2828).

Hereford Bull Calves above Six and not exceeding Twelve Months-old.

Thomas James Carwardine, Stockton Bury, Leominster: **First Prize**, 15*l.*, for "Anxiety," 9 months-old; bred by himself; sire, "Longhorns" (4711): dam, "Helena," by "De Cote" (3060): and **Second Prize**, 10*l.*, for "The Sultan," 10 months, 1 day-old; bred by himself; sire, "Longhorns" (4711); dam, "Florence," by "De Cote" (3060).

William Tudge, Leintwardine, Herefordshire: **Third Prize**, 5*l.*, for "Field Marshal," 11 months, 3 weeks, 3 days-old; bred by himself; sire, "Cannon Ball" (4399); dam, "Evening Star," by "Sir Roger" (4133).

Thomas Thomas, St. Hilary, Cowbridge, Glamorganshire: the *Reserve Number*, to "Horace," 10 months, 5 days-old; bred by himself; sire, "Horace 2nd" (4655); dam, "Sunflower," by "Sir John 3rd" (3456).

Hereford Cows above Three Years-old.

William Tudge, Adforton: **First Prize**, 20*l.*, for "Rosebud," 9 years-old, in-calf; bred by Mr. B. Rogers, The Grove, Pembridge, Herefordshire; sire, "Sir Thomas" (2228); dam, "Rose," by "North Star" (2138).

Thomas James Carwardine, Stockton Bury, Leominster: **Second Prize**, 10*l.*, for "Helena," 3 years, 11 months, 3 weeks, 4 days-old, in-calf and in-milk; bred by himself; sire, "De Cote" (3060); dam, "Regina," by "Heart of Oak" (2035).

William Tudge, Adforton, Leintwardine: **Third Prize**, 5*l.*, for "Giantess," 4 years, 11 months, 3 weeks, 6 days-old; bred by himself; sire, "Sir Roger" (4133); dam, "Haidee," by "Battenhall" (2406).

Thomas Myddleton, Llynhaven, Clun, Shropshire: the *Reserve Number*, to "Nina," 5 years, 1 month, 3 weeks-old, in-milk; bred by himself; sire, "Sultan" (4163); dam, "Miss Nobble 'em," by "Nobleman" (2652).

Hereford Heifers, in-milk or in-calf, not exceeding Three Years-old.

Sarah Edwards, Wintercott, Leominster: First Prize, 15*l*., for "Mabel," 2 years, 11 months, 3 weeks, 5 days-old, in-milk; bred by herself; sire, "Winter de Cote" (4253); dam, "Myrtle 3rd," by "Tomboy" (3546).

William Burchall Peren, Compton House, South Petherton, Somerset: Second Prize, 10*l*., for "Queen of the Roses," 2 years, 7 months, 4 weeks-old, in-calf; bred by himself; sire, "Lord Lincoln" (3220); dam, "Ivington Rose," by "Sir Thomas" (2228).

William Tudge, Adforton, Leintwardine; Third Prize, 5*l*., for "Beatrice," 2 years, 10 months, 1 week, 4 days-old, in-milk; bred by himself; sire, "Lord Hythe" (3937); dam, "Darling," by "Carbonel" (1525).

William Burchall Peren, Compton House: the *Reserve Number*, to "Lady Lottie," 2 years, 11 months, 3 weeks, 1 day-old, in-calf; bred by himself; sire, "Lord Lincoln" (3220); dam, "Lady Evie," by "Plutarch" (3332).

Hereford Yearling Heifers above One and not exceeding Two Years-old.

Sarah Edwards, Wintercott: First Prize, 15*l*., for "Leonora," 1 year, 10 months, 2 weeks, 6 days-old; bred by herself; sire, "Winter de Cote" (4253); dam, "Lovely," by "Tomboy" (3546): and Second Prize, 10*l*., for "Beatrice," 1 year, 10 months, 1 week, 2 days-old; bred by herself; sire, "Winter de Cote" (4253); dam, "Brownmaid 2nd," by "Tomboy" (3546).

Herbert Richard Hall, Ashton House, Leominster: Third Prize, 5*l*., for "Lady Alice," 1 year, 11 months-old; bred by himself; sire, "Preceptor" (4030); dam, "Nutty," by "Major" (2629).

William Tudge, Adforton, Leintwardine: the *Reserve Number* to "Bright Eyes," 1 year, 11 months, 3 weeks, 6 days-old; bred by himself; sire, "Sir Cupis Ball" (2761); dam, "Belladonna," by "Orleans" (2661).

Hereford Heifer Calves above Six and under Twelve Months-old.

Sarah Edwards, Wintercott, Leominster: First Prize, 15*l*., for "Beatrice 2nd," 10 months, 3 weeks, 3 days-old; bred by herself; sire, "Royalist" (4921); dam, "Brownmaid 2nd," by "Tomboy" (3546).

William Taylor, Showle Court, Ledbury, Herefordshire: Second Prize, 10*l*., for "Lancashire Lass," 10 months-old; bred by himself; sire, "Tredegar" (5077); dam, "Lovely," by "Tenant Farmer" (2806).

*Hereford Cows, and each with not less than Two of her Offspring.**

William Taylor, Showle Court, Ledbury: First Prize, 30*l*., for "Hazel," 12 years, 10 months-old; bred by himself; sire, "Tom Brown" (2328); dam, "Hazel," by "Holmer" (2043); g. d., "Hazel," by "Showle" (1384). And *Offspring:* Cow—"Hazel," 9 years, 10 months-old; sire, "Triumph" (2836). Bull—"Taunton" (5035), 2 years, 11 months, 1 week, 6 days-old; sire, "Triumph 2nd" (3553). Bull-calf—"Tredegar 3rd," 10 months, 1 day-old; sire, "Tredegar" (5077). All bred by himself.

Thomas Nott, Letton Court, Brampton Bryan, Herefordshire: Second Prize, 15*l.*, for 8 years, 11 months-old; bred by himself; sire, "Chieftain 3rd" (2357); dam, by "The Grove" (1764). And *Offspring*: Bull—1 year, 2 months, 3 weeks-old; sire, "Hildebrand" (4646). Bull-calf—3 months, 1 week-old; sire, "Cincinnatus" (3749). Both bred by himself.

Devon Bulls above Three Years-old.

Viscount Falmouth, Tregothnan, Probus, Cornwall: First Prize, 25*l.*, for "The Only Jones," 3 years, 8 months, 2 weeks-old; bred by himself; sire, "Arthur" (997); dam, "Photograph" (3758), by "Sunflower" (937).

Walter Farthing, Stowey Court, Bridgwater: Second Prize, 15*l.*, for "Master Willie," 4 years, 3 weeks, 5 days-old; bred by himself; sire, "Master Harry;" dam, "Picture," by "Eclipse."

Devon Bulls above Two and not exceeding Three Years-old.

Viscount Falmouth, Tregothnan: First Prize, 25*l.*, for "Sirloin," 2 years, 8 months, 3 weeks, 2 days-old; bred by himself; sire, "Lord of the Valley" (1150); dam, "Peach" (2095a), by "Young Forester" (759): and Second Prize, 15*l.*, for "Romany Rye," 2 years, 10 months, 1 week, 1 day-old; bred by himself; sire, "Lord of the Valley" (1150); dam, "Cinnaminta" (2572b), by "Protector" (711).

Devon Yearling Bulls above One and not exceeding Two Years-old.

Viscount Falmouth, Tregothnan: First Prize, 25*l.*, for his 1 year, 11 months-old; bred by himself; sire, "Lord of the Valley" (1150); dam, "Reflection" (3880), by "Sunflower" (937).

Walter Farthing, Stowey Court, Bridgwater: Second Prize, 15*l.*, for "Royal Aston," 1 year, 8 months, 3 weeks, 6 days-old; bred by himself; sire, "Master Robin;" dam, "Pretty Face," by "Lovely's Duke:" and Third Prize, 5*l.*, for "Duke of Farrington," 1 year, 3 weeks, 5 days-old; bred by Mr. Robert Farthing, Farrington, Bridgwater; sire, "The Shah."

Devon Bull Calves above Six and not exceeding Twelve Months-old.

Walter Farthing, Stowey Court, Bridgwater: First Prize, 15*l.*, for his 7 months, 3 weeks, 6 days-old; bred by himself; sire, "Master James;" dam, "Famous," by "Son of Lord Quantock."

Mrs. Langdon, Flitton Barton, North Molton, Devon: Second Prize, 10*l.*, for "Duke of Flitton 14th," 11 months, 3 weeks, 6 days-old; bred by herself; sire, "Young Palmerston" (1251); dam, "Temptress 2nd" (3070), by "Duke of Cornwall" (820); and Third Prize, 5*l.*, for "Lord Bath," 7 months, 6 days-old; bred by herself; sire, "Jonquil" (1131); dam, "Lovely Queen 4th" (3673), by "Duke of Flitton 5th" (1069).

Devon Cows above Three Years-old.

Walter Farthing, Stowey Court, Bridgwater: First Prize, 20*l.*, for "Prettyface," 4 years, 6 months, 1 week, 3 days-old, in-milk and in-calf; bred by himself; sire, "Lovely's Duke; dam, "Prettyface," by "Sir George."

Mrs. Langdon, Flitton Barton, North Molton: Second Prize, 10*l.*, for "Actress 8th" (3149), 3 years, 10 months, 2 weeks, 6 days-old, in-milk and in-calf; bred by herself; sire, "Duke of Flitton 8th" (1072); dam, "Actress 5th" (3146), by "Duke of Flitton 4th" (827).

Frederic William Earle, Edenhurst, Huyton, Liverpool: **Third Prize**, 5*l.*, for "Blossom," 7 years, 6 months-old, in-milk; bred by Mr. T. Pope, Horningsham, Warminster.

Devon Heifers in-milk or in-calf, not exceeding Three Years-old.

Walter Farthing, Stowey Court: **First Prize**, 15*l.*, for "Picotee," 2 years, 9 months, 3 weeks-old, in-calf; bred by Mr. Trevor Lee Senior, Broughton House, Aylesbury; sire, "Major;" dam, "Pink," by "Prince of Wales."

Devon Yearling Heifers above One and not exceeding Two Years old.

Mrs. Langdon, Flitton Barton, North Molton: **First Prize**, 15*l.*, for "Temptress 8th," 1 year, 1 month, 2 weeks, 2 days-old; bred by herself; sire, "Duke of Flitton 10th" (1074); dam, "Temptress 5th" (3963), by "Duke of Flitton 5th" (1069).

Walter Farthing, Stowey Court: **Second Prize**, 10*l.*, for "Ladybird," 1 year, 8 months, 2 weeks, 6 days-old; bred by Viscount Portman, Bryanston, Blandford; sire, "Duke of Plymouth;" dam, "Lemon," by "Prince Albert."

Devon Heifer-Calves above Six and under Twelve Months-old.

Walter Farthing, Stowey Court: **First Prize**, 15*l.*, for "Prettyface 2nd," 9 months, 2 days-old; bred by himself; sire, "Master Willie;" dam, "Prettyface," by "Lovely's Duke:" and **Second Prize**, 10*l.*, "Moss Rose 5th," 10 months, 2 weeks, 2 days-old; bred by Mr. Trevor Lee Senior, Broughton House, Aylesbury; sire, "Son of Forester;" dam, "Moss Rose."

Mrs. Langdon, Flitton Barton, North Molton: **Third Prize**, 5*l.*, for "Lovely Queen 7th," 11 months, 1 day-old; bred by herself; sire, "Duke of Flitton 12th;" dam, "Lovely Queen 3rd" (3672), by "Duke of Flitton 8th" (1072).

Her Majesty the Queen, Windsor Castle: the *Reserve Number*, to "Princess Beatrice," 11 months, 1 week, 1 day-old; bred by Her Majesty, Norfolk Farm, Windsor; sire, "Prince George Frederick;" dam, "Rosebud," by Trio.

Jersey Bulls above Two Years-old.

Thomas Horrocks Miller, Singleton Park, Poulton-le-Fylde, Lancashire: **First Prize**, 20*l.*, for "Father Joseph," silver-grey, 2 years, 4 months, 1 week, 2 days-old; bred by himself; dam, "St. Josephine."

George Simpson, Wray Park, Reigate, Surrey: **Second Prize**, 10*l.*, for "Romeo," silver-grey, 2 years, 4 months, 2 weeks, 2 days-old; bred by Mr. E. Simon, Jun., St. John's, Jersey; sire, "Dolphin;" dam, "Violette."

Lord Chesham, Latimer, Chesham, Bucks: **Third Prize**, 5*l.*, for "Fanfaron," silver grey, 3 years, 2 days-old; bred by Mr. W. Gilbey.

George Simpson, Wray Park: the *Reserve Number*, to "May Duke," silver-grey, 2 years, 5 months-old; bred by himself; sire, "Queen's Favourite;" dam, "May," by "Perfection."

Jersey Bulls above One Year and not exceeding Two Years-old.

George Simpson, Wray Park: **First Prize**, 20*l.*, for "The Pride," grey, 1 year, 4 months, 4 weeks, 1 day-old; bred by Captain Francis Perrée, St. Mary's, Jersey; sire, "Valentine;" dam, "Belle Grisette;" and **Second Prize**, 10*l.*, for "Gauntlett," grey fawn, 1 year, 1 month, 5 days-old; bred by himself; sire, "Gipsy King;" dam, "Gentle."

Herbert Addington Rigg, Wykeham Lodge, Walton-on-Thames, Surrey: **Third Prize**, 5*l.*, for "Gipsy Lad," silver-grey, 1 year, 4 months, 4 weeks, 1 day-old; bred by himself; sire, "Gipsy King;" dam, "Topsy," by "Grays."

Sir David Baird, Bart., Newbyth, Prestonkirk, N.B.: the *Reserve Number* to "Jehu," smoky fawn, 1 year, 11 months, 2 weeks, 4 days-old; bred by himself.

Jersey Cows above Three Years-old.

George Simpson, Wray Park: **First Prize**, 20*l.*, for "Luna," fawn, 3 years, 4 months, 1 week, 4 days-old, in-milk; bred by Mr. J. C. Hamon, St. John's, Jersey; sire, "Pierre;" dam, "Full Moon."

Herbert Addington Rigg, Wykeham Lodge, Walton-on-Thames: **Second Prize**, 10*l.*, for "Young Fawn," fawn, 3 years, 10 months-old, in-calf; bred by the late Sir J. Hawley, Leybourne Grange, West Malling, Kent.

George Simpson, Wray Park: **Third Prize**, 5*l.*, for "Venus," silver-grey, 3 years, 1 month, 2 weeks, 5 days-old, in-milk; bred by Mr. Lesbird, Jersey; sire, "Welcome;" dam, "Musique;" and the *Reserve Number*, to "Lemon-peel 2nd," fawn, 3 years, 2 months, 3 weeks, 6 days-old, in-milk; bred by Mr. J. Le Templier, St. Clement's, Jersey; sire, "Hero;" dam, "Lemon-peel."

Jersey Heifers, in-milk or in-calf, not exceeding Three Years-old.

George Simpson, Wray Park: **First Prize**, 20*l.*, for "Promise," light-fawn, 2 years, 5 months, 2 weeks, 3 days-old, in-milk; bred by Mr. F. de Gruchy, Jersey; sire, "Duke;" dam, "Rosette;" and **Second Prize**, 10*l.*, for "Pretty Girl," silver-grey, 2 years, 2 months, 1 week, 4 days-old, in-milk; bred by himself; sire, "Prince Crocus;" dam, "Pretty Maid."

Edmund Birch Gibson, Saffron Walden, Essex: **Third Prize**, 5*l.*, for "Maid of Athens," silver-grey, 1 year, 8 months, 1 week, 1 day-old, in-calf; bred by himself; sire, "Ducal;" dam, "Lady Grey," by "Clement."

Lord Chesham, Latimer, Chesham, Bucks: the *Reserve Number*, to "Ella," silver-grey, 2 years, 5 months, 3 days-old, in-calf; bred by himself; sire, "The Baron;" dam, "Eyebright," by "Dandy."

Guernsey Cows above Three Years-old.

Herbert Spencer Woodcock, The Elms, Wigan, Lancashire: **First Prize**, 15*l.*, for his fawn, 3 years, 2 months, 2 weeks, 2 days-old, in-calf; bred by Mr. Ozier, Guernsey; sire, "Excelsior."

Sussex Bulls above Three Years-old.

Edward and **Alfred Stanford**, Eatons, Ashurst, Steyning, Sussex: **First Prize**, 15*l.*, for "Dorchester," 5 years, 7 months, 3 weeks-old; bred by themselves; sire, "Volunteer;" dam, "Mary Fern."

Charles Whitehead, Barming House, Maidstone, Kent: **Second Prize**, 10*l.*, for "May Duke" (252), 3 years, 8 months, 2 weeks, 1 day-old; bred by Mr. R. Durrant, Froghole, Mayfield, Sussex; sire, "A Fairlight Bull;" dam, "Curly Smith No. 4."

Sussex Bulls above Two and not exceeding Three Years-old.

George Smith, Paddockhurst, Crawley, Sussex: **First Prize**, 15*l.*, for "Young Hartley," 2 years, 11 months, 1 week, 6 days-old; bred by himself; sire of dam, "Young Broad," by "Slinfold."

Edward and **Alfred Stanford**, Eatons, Ashurst, Steyning: **Second Prize**, 10*l.*, for "Tunbridge," 2 years, 5 months, 3 weeks, 4 days-old; bred by themselves; sire, "Dorchester;" dam, "Marvel."

Sussex Yearling Bulls above One Year and not exceeding Two Years-old.

Alfred Agate, West Street, Horsham, Sussex: **First Prize**, 10*l.*, for "Berry," 1 year, 9 months, 2 weeks, 3 days-old; bred by himself; sire, "Frankenstein" (181); dam, "Young Betsy," by "Midsummer" (39).

Edward and Alfred Stanford, Eatons, Ashurst, Steyning: **Second Prize**, 5*l.*, for "Clayton," 1 year, 9 months, 2 weeks, 1 day-old; bred by Mr. P. H. Ellis, Northease, Lewes, Sussex; dam, "Knight Errant."

Sussex Cows above Three Years-old.

Edward and Alfred Stanford, Eatons: **First Prize**, 15*l.*; for "Dorset," 7 years-old, in-calf; bred by themselves; sire, "Young Westminster."

Charles Child, Park House, Slinfold, Horsham: **Second Prize**, 10*l.*, for "Gillhope Berry 2nd," 7 years, 5 months-old, in-milk and in-calf; bred by Mr. B. Noakes, of Gillhope Farm, Mayfield, Sussex; sire, "Cadborough."

Sussex Heifers in-milk or in-calf, above Two and not exceeding Three Years-old.

Alfred Agate, West Street, Horsham: **First Prize**, 15*l.*, for "Adelaide 5th," 2 years, 9 months, 4 days-old, in-calf; bred by himself; sire, "Alfred 2nd" (177); dam, "Adelaide 3rd" (1372) by "Alfred" (152).

Edward and Alfred Stanford, Eatons, Ashurst, Steyning: **Second Prize**, 10*l.*, for "Rosedew 2nd," 2 years, 11 months, 2 days-old, in-calf; bred by themselves; sire, "Dorchester."

Sussex Yearling Heifers, above One Year and not exceeding Two Years-old.

Alfred Agate, West Street, Horsham: **First Prize** 10*l.*, for "Gentle," 1 year, 10 months, 3 weeks-old; bred by Mr. W. Larking, Ashdown House, East Grinstead; sire, "Frankenstein" (181); dam, "Gentle," by "Sandgate Berry."

Charles Child, Park House, Slinfold, Horsham: **Second Prize**, 5*l.*, for "Jet," 1 year, 7 months, 1 week-old; bred by himself; sire, "Lion" (229); dam "Jewel" (1419), by "Baron" (163).

Norfolk and Suffolk Polled Bulls above One Year-old.

Jeremiah James Colman, M.P., Carrow House, Norwich, **First Prize**, 15*l.*, for "Lord John" (340), 2 years, 8 months-old; bred by himself; sire, "Powell" (143); dam, "Daisy 1st, H. 2," by "Young Duke" (234).

Henry Birkbeck, Stoke Holy Cross, Norwich: **Second Prize**, 10*l.*, for "Beau," 1 year, 9 months, 3 weeks, 1 day-old; bred by himself; sire, "Norfolk Duke;" dam, "Belle," by "Tenant Farmer."

Norfolk and Suffolk Polled Cows above Three Years-old.

Jeremiah James Colman, M.P., Carrow House, Norwich: **First Prize**, 15*l.*, for "Fanny" (A. 9), 5 years, 10 months, 1 week, 6 days-old, in-milk and in-calf; bred by Lord Sondes, Elmham Hall, East Dereham, Norfolk; sire, "Hero 3rd" (87); dam, "Madame Freeman."

Norfolk and Suffolk Polled Heifers, in-milk or in-calf, not exceeding Three Years-old.

Henry Birkbeck, Stoke Holy Cross, Norwich: **First Prize**, 15*l.*, for "Bee," red, 3 years, 10 months, 2 weeks-old, in-calf; bred by himself; sire "Young Duke;" dam, "Thursford," by "Tenant Farmer."

*Welsh Bulls Two Years-old and upwards.**

Earl of Cawdor, Stackpole Court, Pembroke: **First Prize**, 15*l.*, for "Prince of Wales," black, 2 years, 5 months, 2 weeks, 3 days-old; bred by Mr. Prosser, Llanrian, Haverfordwest, South Wales; sire, "Ap-Gelert;" dam, "Ruth 2nd."

John Davies, Alleston, Pembroke: **Second Prize**, 10*l.*, for "The Shah," black, 5 years, 6 months, 3 weeks-old;" bred by himself; sire, "Roger;" dam, "Queen," by "Champion."

Edward Humphreys, Carnarvon; **Third Prize**, 5*l.*, for "Douglas," black, 3 years, 3 months-old; bred by Mr. C. Parry, Llwyn Ysca, Llandegfan,

Richard Humphreys, Beddgelert, Carnarvonshire: the *Reserve Number*, to "Prince Llewelyn 2nd," black, 3 years, 7 months, 4 weeks-old; bred by himself; sire, "Prince of Wales 1st;" dam, "Nell."

*Welsh Bulls under Two Years-old.**

Thomas Jones, Tai Ucha, Hafod Elwy, Cerrig-y-Druidion, Denbighshire: **First Prize**, 15*l.*, for "Prince Albert," black, 1 year, 6 months, 1 week, 4 days-old; bred by himself.

Charles Salusbury Mainwaring, Llaethwryd, Corwen, Denbighshire; **Second Prize**, 10*l.*, for "Gemmi," black, 1 year, 7 months, 1 week, 6 days-old; bred by himself; sire, "Llanrwst; dam, "Dairy."

Richard Humphreys, Beddgelert, Carnarvonshire: **Third Prize**, 5*l.*, for "Prince of Wales 2nd," black, 1 year, 9 months, 3 weeks, 5 days-old; bred by himself; dam, "Pegan."

John Griffiths, Penallycourt, Tenby, Pembrokeshire: the *Reserve Number*, to, "Hobart Pasha," black, 1 year, 8 months, 1 week, 6 days-old; bred by himself; sire, "The Shah;" dam "Lovely," by "Billy."

*Welsh Cows, in-Milk or in-Calf, Three Years-old and upwards.**

Richard Humphreys, Beddgelert, Carnarvonshire: **First Prize**, 15*l.*, for "Black Queen," black, 7 years, 1 month, 2 weeks, 1 day-old, in-calf; bred by himself; dam, "Jenny:" and **Second Prize**, 10*l.*, for "Duchess," black, 5 years, 3 weeks, 2 days-old, in-calf; bred by himself; sire, "Prince of Wales 1st;" dam, "Jenny."

John Walters, Molfre Isa, Carmarthen: **Third Prize**, 5*l.*, for "Cwrlen," black, 6 years, 5 months-old, in-milk and in-calf; bred by himself; sire, "King Tom."

William Evans, Posty, Bletherstone, Narberth, Pembrokeshire: the *Reserve Number*, to "Curlen 2nd," black, 6 years, 2 months-old, in-calf; bred by Mr. G. Evans, Bletherstone, Narberth; sire, "Billy of Rowston;" dam, "Curlen," by "Lydstep."

*Welsh Heifers, in-Milk or in-Calf, under Three Years-old.**

Francis Griffith Jones, Ciltalgarth, Bala, Merionethshire: **First Prize**, 15*l.*, for "Black Queen," black, 2 years, 7 months, 4 days-old, in-calf; bred by himself; dam by "Fron Goch Simon."

John Davies, Alleston, Pembroke: **Second Prize**, 10*l.*, for "Princess," black, 2 years, 5 months, 2 weeks, 2 days-old, in-calf; bred by himself; sire, "The Shah;" dam, "Countess," by "Roger:" and **Third Prize**, 5*l.*, for "Favourite," black, 2 years, 6 months, 2 weeks, 5 days-old, in-calf; bred by himself; sire, "The Shah;" dam, "Flower," by "Roger."

Richard Humphreys, Beddgelert: the *Reserve Number*, to his black, 2 years, 6 months, 3 weeks-old, in-calf; bred by himself; sire, "Prince Llewelyn 1st;" dam, "Nancy."

*Longhorn Bulls of any age.**

The Duke of Buckingham and Chandos, Stowe, Buckingham: **First Prize**, 15*l.*, for "Conqueror 3rd," brindle and white, 5 years, 11 months, 3 weeks old; bred by himself; sire, "Young Conqueror;" dam, "Lady."

Samuel Forrest, The Chase, Kenilworth, Warwickshire: **Second Prize**, 10*l.*, for "Sirius," brindle and white, 3 years, 4 months, 3 weeks, 2 days-old; bred by Mr. J. H. Burbery, Montague House, Kenilworth; sire, "Crown Prince;" dam, "Star," by "The Baron."

Richard Hall, Boro' Fields, Walton, Burton-on-Trent: **Third Prize**, 5*l.*, for "Ranger," red and white, 4 years, 6 months-old; bred by Mr. Satchwell, Knowle, Birmingham; sire, "Twopenny;" dam, "Lady Arden," by "Rockingham."

William John Legh, M.P., Lyme Park, Disley, Cheshire: the *Reserve Number*, to "Lord Darnley," brindle and white, 1 year, 11 months-old; bred by the Duke of Buckingham; sire, "Conqueror 3rd;" dam, "Duchess," by "Boycott."

*Longhorn Cows, in-Milk or in-Calf, Three Years-old or upwards.**

William Gray Farmer, Hinckley, Leicestershire: **First Prize**, 15*l.*, for "Spring Flower," dark red, 4 years, 6 months-old, in-milk; bred by himself.

The Duke of Buckingham and Chandos, Stowe, Buckingham: **Second Prize**, 10*l.*, for "Wild Rose," brindle and white, 8 years, 6 months, 1 week, 2 days-old, in-calf; bred by himself; sire, "Conqueror;" dam, "Wildfire," by "Boycott."

Samuel Forrest, The Chase, Kenilworth, Warwickshire: **Third Prize**, 5*l.*, for "Lady," white, 7 years, 3 months, 5 days-old, in-milk and in-calf; bred by Mr. J. H. Burbery, Montague House, Kenilworth; sire "Earl of Upton 4th," dam, "Beauty 2nd," by "The Baron:" and the *Reserve Number*, to "Strawberry," white and brindle, 8 years, 2 months, 3 weeks, 4 days-old, in-calf; bred by Mr. J. H. Burbery; sire, "Earl of Upton 4th;" dam, "Cowslip 2nd," by "The Baron."

*Longhorn Heifers, in-Milk or in-Calf, under Three Years-old.**

RICHARD HALL, Boro' Fields, Walton, Burton-on-Trent: FIRST PRIZE, 15*l.*, for "Pride of the Park," brindle and white, 2 years, 2 months-old, in-calf; bred by Mr. N. E. Taverner, Upton Park, Nuneaton; sire, "Brindled Boy;" dam, "Beauty," by Mr. Chapman's "Wild Bull."

THE DUKE OF BUCKINGHAM AND CHANDOS, Stowe, Buckingham: SECOND PRIZE, 10*l.*, for "Countess of Temple," brindle and white, 2 years, 10 months, 4 days-old, in-calf; bred by himself; sire, "Conqueror 3rd;" dam, "Lady Mary," by "Young Conqueror."

RICHARD HALL, Boro' Fields, Walton: THIRD PRIZE, 5*l.*, for "Weston's Farewell," red and white, 2 years, 2 months, 3 weeks, 1 day-old, in-calf; bred by Mr. Berry, Stoke Golding, Nuneaton; sire, "Royal Duke of Upton 1st;" dam, "Damsel," by "Upton Hero."

*Ayrshire Bulls of any Age.**

JOHN HUNGERFORD ARKWRIGHT, Hampton Court, Leominster, Herefordshire: FIRST PRIZE, 15*l.*, for "Robert Burns," red and white, 3 years, 2 months, 4 days-old; bred by himself; dam, "Daisy."

JAMES FIRTH CROWTHER, Knowle Grove, Mirfield, Yorkshire: SECOND PRIZE, 10*l.*, for his red and white, 2 years, 2 months, 2 weeks-old; bred by Mr. Struchun, Lochgreen, Denny.

JOHN STEWART, Burnside Cottage, Strathaven, Lanarkshire: THIRD PRIZE, 5*l.*, for "Wellington," brown and white, 2 years, 3 months, 2 weeks, 6 days-old; bred by Mr. W. Cochran, Grange Farm, Eaglesham, Renfrew.

*Ayrshire Cows or Heifers in-Milk or in-Calf.**

ALEXANDER CASSELS, Border Farm, Gayton, Neston, Cheshire: FIRST PRIZE, 15*l.*, for "Jeanie," white and red, about 5 years old, in-calf; breeder unknown.

ARTHUR WOODS, The Wilderness, Walton-on-the-Hill, Aintree, Liverpool: SECOND PRIZE, 10*l.*, for "Beauty," red and white; age and breeder unknown; in-milk and in-calf; calved March 7, 1877.

JOHN STEWART, Burnside Cottage, Strathaven, Lanark: THIRD PRIZE 5*l.*, for "Beauty," brown, about 5 years, 3 months-old, in-calf; bred by Mr. J. Brown, Blacklaw, Stewarton, Ayrshire.

ARTHUR WOODS, The Wilderness, Walton-on-the-Hill, Aintree: the *Reserve Number*, to "Daisy," red and white, in-milk and in-calf; age and breeder unknown.

*Polled Galloway Bulls of any Age.**

GEORGE GRAHAM, Oakbank, Longtown, Cumberland: FIRST PRIZE, 15*l.*, for "Viscount Preston" (1008), black, 2 years, 5 months, 1 week, 1 day-old; bred by Mr. J. Graham, Parcelstown, Longtown; sire, "Sim of Whitram" (562); dam, "Semiramis 4th" (1422), by "Willie of Westburn Flat" (523).

JAMES GRAHAM, Parcelstown, Longtown: SECOND PRIZE, 10*l.*, for "Sim of Whitram" (562), black, 4 years, 3 months, 4 weeks, 1 day-old; bred by Mr. J. Cunningham, Tarbreoch, Dalbeattie, Kirkcudbright; sire, "Pretender" 617; dam, "Lady Stanley" (1672).

Polled Galloway Cows or Heifers in-Milk or in-Calf.

JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, Kirkcudbright: FIRST PRIZE, 15*l.*, for "Lady Stanley 3rd" (2861), black, 2 years, 3 months, 3 days-old, in-calf; bred by himself; ; sire, "Pretender" (617); dam, "Lady Stanley": and SECOND PRIZE, 10*l.*, for "Bridesmaid" (1674), black, 5 years, 5 months, 2 weeks, 1 day-old, in-milk and in-calf; bred by himself; sire, "Observer" (728); dam, "Mary 2nd" (1671), by "Balig" (729): and THIRD PRIZE, 5*l.*, for "Lady Stanley 2nd" (2858), black, 3 years, 1 month, 2 weeks, 3 days-old, in-milk and in-calf; bred by himself; sire, "Pretender" (617); dam, "Lady Stanley" (1670).

JAMES GRAHAM, Parcelstown, Longtown, Cumberland: the *Reserve Number*, to "Maid Marian 7th" (2609), black, 2 years, 5 months, 2 weeks, 1 day-old, in-calf; bred by himself; sire, "Sim of Whitram" (562); dam, "Marian Ramsey" (1330), by "Willie of Westburnflat" (23).

*Pairs of Dairy Cows in-Milk.**

RICHARD STRATTON, The Duffryn, Newport, Monmouthshire: FIRST PRIZE, 30*l.*, for his roan Shorthorns, "Fairy Queen," 6 years, 5 months-old; sire, "Reflector" (27,259); dam, "Fairy," by "Orontes" (24,695); and "Alice," 8 years, 4 months-old; sire, "Orontes" (24,695); dam, "Fairy;" both bred by himself.

THE STAND STUD COMPANY, Stand, Whitefield, near Manchester: SECOND PRIZE, 20*l.*, for "Rose" and "Beauty," red and white; ages and breeders unknown.

JOHN STEWART, Burnside Cottage, Strathaven, Lanark: THIRD PRIZE, 10*l.*, for his brown and white Ayrshires; about 4 years, 3 months-old; breeders unknown.

THE STAND STUD COMPANY: the *Reserve Number*, to "Dairymaid" and "Milkmaid," roan; ages and breeders unknown.

*Dairy Cows in-Milk.**

JAMES FIRTH CROWTHER, Knowle Grove, Mirfield, Yorkshire; FIRST PRIZE, 15*l.*, for his roan Yorkshire, in-calf; age and breeder unknown.

THE STAND STUD COMPANY, Stand, Whitefield, Manchester: SECOND PRIZE, 10*l.*, for "Buttercup," red and white, Yorkshire, in-milk; age and breeder unknown.

JOHN STEWART, Burnside Cottage, Strathaven, Lanark: THIRD PRIZE, 5*l.*, for "Dandy," white, Ayrshire, about 5 years, 2 months-old, in-milk; bred by Mr. Robert Dixson, Dodside, Mearns, Renfrew.

JOHN GRANT MORRIS, Allerton Priory, Woolton, Liverpool: the *Reserve Number*, to "Beauty," black and white, Kerry, about 12 years-old, in-milk; breeder unknown.

SHEEP.

Leicester Shearling Rams.

Teasdale Hilton Hutchinson, Manor House, Catterick, Yorkshire: **First Prize**, 20*l.*, for his 1 year, 3 months-old; bred by himself.

George Turner, jun., Thorpelands, Northampton: **Second Prize**, 10*l.*, for his 1 year, 3 months, 2 weeks-old: bred by himself.

John Borton, Manor House, Barton-le-Street, Malton, Yorkshire: **Third Prize**, 5*l.*, for his 1 year, 4 months-old; bred by himself.

Robert Ward Cresswell, Ravenstone, Ashby-de-la-Zouch: *Reserve Number*, to his 1 year, 4 months-old; bred by himself.

Leicester Rams of any age.

John Borton, Manor House, Barton-le-Street: **First Prize**, 20*l.*, for his 3 years, 4 months-old; bred by himself.

George Turner, jun., Thorpelands: **Second Prize**, 10*l.*, for his 3 years, 3 months, 2 weeks-old; bred by himself.

John Borton: **Third Prize**, 5*l.*, for his 3 years 4 months-old; bred by himself.

Thomas Marris, Croxton, Ulceby, Lincolnshire: the *Reserve Number*, to his 2 years, 4 months, 1 week-old; bred by himself.

Leicester Shearling Ewes, Pens of Five.

The Executors of the late Francis Jordan, Eastburn, Driffield, Yorkshire: **First Prize**, 15*l.*, for their 1 year, 3 months-old; bred by themselves.

William Brown, High Gate House, Holme-on-Spalding-Moor, Yorkshire: **Second Prize**, 10*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself.

George Turner, jun., Thorpelands: **Third Prize**, 5*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself.

Teasdale Hilton Hutchinson, Manor House, Catterick: the *Reserve Number*, to his 1 year, 3 months, 2 weeks-old; bred by himself.

*Border Leicester Shearling Rams.**

James Melvin, Bonnington Ratho, Wilkieston, Mid-Lothian: **First Prize**, 20*l.*, for his 1 year, 4 months-old; bred by himself: and **Second Prize**, 10*l.*, for his 1 year, 4 months-old; bred by himself.

Richard Tweedie, The Forest, Catterick, Yorkshire: **Third Prize**, 5*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself.

Richard Tweedie: the *Reserve Number*, to his 1 year, 3 months, 2 weeks-old; bred by himself.

*Border Leicester Rams of any other Age.**

Richard Tweedie, The Forest, Catterick, Yorkshire: **First Prize**, 20*l.*, for his "Fitz James," 4 years, 3 months, 2 weeks-old; bred by himself; sire, "Sir James;" dam, by "Sir Samuel."

*Border Leicester Shearling Ewes, Pens of Five.**

RICHARD TWEEDIE, The Forest, Catterick: FIRST PRIZE, 15*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself: and SECOND PRIZE, 10*l.*, for his 1 year, 3 months, 2 weeks old; bred by himself.

JAMES MELVIN, Bonnington Ratho, Wilkieston, Mid-Lothian: THIRD PRIZE, 5*l.*, for his 1 year, 4 months-old; bred by himself.

RICHARD TWEEDIE, The Forest: the *Reserve Number*, to his 1 year, 3 months, 2 weeks-old; bred by himself.

Cotswold Shearling Rams.

JOHN GILLETT, Oaklands, Charlbury, Oxfordshire: FIRST PRIZE, 20*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

JOHN JAMES GODWIN, Troy Farm, Somerton, Deddington, Oxfordshire: SECOND PRIZE, 10*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

JOHN GILLETT: THIRD PRIZE, 5*l.*, for his 3 years, 4 months, 2 weeks-old; bred by himself.

THOMAS BROWN, Marham Hall, Downham Market: the *Reserve Number*, to his 1 year, 4 months, 2 weeks-old; brod by himself.

Cotswold Rams of any other Age.

SAMUEL SMITH, Somerton, Deddington, Oxfordshire: FIRST PRIZE, 20*l.*, for his 2 years, 4 months-old; bred by himself.

JOHN JAMES GODWIN, Troy Farm: SECOND PRIZE, 10*l.*, for his 3 years, 4 months, 2 weeks-old; bred by himself.

RUSSELL SWANWICK, the Royal Agricultural College Farm, Cirencester: THIRD PRIZE, 5*l.*, for his 2 years, 5 months-old; bred by himself: and the *Reserve Number*, to his 2 years, 5 months-old; bred by himself.

Cotswold Shearling Ewes, Pens of Five.

ROBERT JACOBS, Signett Hill, Burford, Oxfordshire: FIRST PRIZE, 15*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

JOHN JAMES GODWIN, Troy Farm, Somerton, Deddington, Oxfordshire: SECOND PRIZE, 10*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

JOHN GILLETT, Oaklands, Charlbury, Oxfordshire: THIRD PRIZE, 5*l.*, for his 1 year, 4 months. 2 weeks-old; bred by himself.

ROBERT JACOBS, Signett Hill: the *Reserve Number*, to his 1 year, 4 months, 2 weeks-old; bred by himself.

Lincoln Shearling Rams.

ARTHUR GARFIT, Scothern, Lincoln: FIRST PRIZE, 20*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself: and SECOND PRIZE, 10*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

THOMAS CARTWRIGHT, Dunston Pillar, Sleaford, Lincolnshire: THIRD PRIZE, 5*l.*, for his 1 year, 4 months-old; bred by himself.

ROBERT WRIGHT, Nocton Heath, Lincoln: the *Reserve Number* to his 1 year, 4 months-old; bred by himself.

Lincoln Rams of any other Age.

Henry Smith, The Grove, Cropwell Butler, Bingham, Nottinghamshire: First Prize, 20*l.*, for "Hermit," 3 years, 4 months-old; bred by Mr. T. Casswell, Pointon, Falkingham.

Robert Wright, Nocton Heath, Lincoln: Second Prize, 10*l.*, for his 4 years, 4 months-old; bred by the late Mr. Kemp, Thurlby Grange, Alford.

John Pears, Mere, Lincoln: Third Prize, 5*l.*, for his 3 years, 4 months-old; bred by himself.

Lincoln Shearling Ewes, Pens of Five.

John Pears, Mere, Lincoln: First Prize, 15*l.*, for his 1 year, 4 months-old; bred by himself.

Thomas Cartwright, Dunston Pillar, Sleaford, Lincolnshire: Second Prize, 10*l.*, for his 1 year, 4 months-old; bred by himself.

Robert Wright, Nocton Heath, Lincoln: Third Prize, 5*l.*, for his 1 year, 4 months-old; bred by himself.

William and Henry Dudding, Panton House, Wragby, Lincolnshire: the *Reserve Number*, to their 1 year, 3 months, 3 weeks-old; bred by themselves.

Oxfordshire Down Shearling Rams.

Frederick Street, Somersham Park, St. Ives, Hunts: First Prize, 20*l.*, for his 1 year, 5 months-old; bred by himself.

John Treadwell, Upper Winchendon, Aylesbury: Second Prize, 10*l.*, for "The Earl of Beaconsfield," about 1 year, 4 months, 2 weeks-old; bred by himself; sire, "Freeland:" and Third Prize, 5*l.*, for "Royal Liverpool," about 1 year, 4 months, 2 weeks-old; bred by himself; sire, "Freeland."

Albert Brassey, Heythrop Park, Chipping Norton: the *Reserve Number*, to his 1 year, 5 months-old; bred by himself.

Oxfordshire Down Rams of any other Age.

A. F. Milton Druce, Twelve Acres, Eynsham, Oxon: First Prize, 20*l.*, for "Campsfield," 3 years, 5 months-old; bred by himself; sire, "Longland:" and Second Prize, 10*l.*, for "Freeland 2nd," 2 years, 5 months-old; bred by himself; sire, "Burghfield."

Frederick Street, Somersham Park, St. Ives, Hunts: Third Prize, 5*l.*, for his 2 years, 5 months-old; bred by himself.

Albert Brassey, Heythrop Park, Chipping Norton, Oxfordshire: the *Reserve Number*, to his 2 years, 4 months-old; bred by himself.

Oxfordshire Down Shearling Ewes, Pens of Five.

George Adams, Pidnell Farm, Faringdon, Berkshire: First Prize, 15*l.*, for his 1 year, 4 months, 2 weeks-old; bred by himself.

John Treadwell, Upper Winchendon, Aylesbury, Bucks: Second Prize, 10*l.*, for his about 1 year, 4 months, 2 weeks-old; bred by himself.

A. F. Milton Druce, Twelve Acres, Eynsham, Oxon: **Third Prize**, 5*l.*, for his 1 year, 5 months-old; bred by himself.

Albert Brassey, Heythrop Park: the *Reserve Number*, to his 1 year, 5 months-old; bred by himself.

Southdown Shearling Rams.

Sir Nicholas William Throckmorton, Bart., Buckland, Faringdon: **First Prize**, 20*l.*, for his 1 year, 4 months-old; bred by himself.

William Rigden, Hove, Brighton: **Second Prize**, 10*l.*, for his 1 year, 4 months-old; bred by himself.

Sir Nicholas William Throckmorton, Bart., Buckland: **Third Prize**, 5*l.*, for his 1 year, 4 months-old; bred by himself.

John and Alfred Heasman, Angmering, Arundel, Sussex: the *Reserve Number*, to their 1 year, 5 months-old; bred by themselves.

Southdown Rams of any other Age.

Lord Walsingham, Merton Hall, Thetford, Norfolk: **First Prize**, 20*l.*, for his 2 years, 4 months-old; bred by himself: and **Second Prize**, 10*l.*, for his 2 years, 4 months-old; bred by himself.

George Jonas, Ickleton, Great Chesterford, Cambs.: **Third Prize**, 5*l.*, for his 2 years, 4 months-old; bred by himself.

The Duke of Richmond and Gordon, K.G., Goodwood, Chichester: the *Reserve Number*, to his 2 years, 4 months-old; bred by himself.

Southdown Shearling Ewes, Pens of Five.

Sir Nicholas William Throckmorton, Bart., Buckland, Faringdon, Berkshire: **First Prize**, 15*l.*, for his 1 year, 4 months-old; bred by himself.

H.R.H. the Prince of Wales, K.G., Sandringham, King's Lynn, Norfolk: **Second Prize**, 10*l.*, for his 1 year, 4 months-old; bred by His Royal Highness.

Lord Walsingham, Merton Hall, Thetford, Norfolk: **Third Prize**, 5*l.*, for his 1 year, 4 months-old; bred by himself.

Jeremiah James Colman, M.P., Carrow House, Norwich: the *Reserve Number*, to his 1 year, 4 months-old; bred by himself.

Shropshire Shearling Rams.

Henry Townshend, Caldicote Hall, Nuneaton, Warwickshire: **First Prize**, 20*l.*, for his 1 year, 4 months-old; bred by himself; sire, "Example."

Lord Chesham, Latimer, Chesham, Bucks: **Second Prize**, 10*l.*, for his 1 year, 3 months-old; bred by himself.

Thomas James Mansell, Dudmaston Lodge: **Third Prize**, 5*l.*, for his 1 year, 4 months-old; bred by himself.

Lord Chesham, Latimer, Chesham: the *Reserve Number*, to his 1 year, 3 months-old; bred by himself; sire, "Marquis of Bute."

Shropshire Rams of any other Age.

Thomas Mansell, Ercall Park, Wellington, Salop: **First Prize**, 20*l.*, for his 2 years, 4 months-old; bred by himself.

Henry Townshend, Caldicote Hall, Nuneaton, Warwickshire: **Second Prize**, 10*l.*, for his 2 years, 4 months-old; bred by himself; sire, "Sample."

Francis Bach, Onibury, Craven Arms, Salop: **Third Prize**, 5*l.*, for his 3 years, 3 months, 3 weeks-old; bred by himself.

Shropshire Shearling Ewes, Pens of Five.

Lord Chesham, Latimer, Chesham: **First Prize**, 15*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself.

Francis Bach, Onibury, Craven Arms: **Second Prize**, 10*l.*, for his 1 year, 3 months, 3 weeks-old; bred by himself.

Thomas Nock, Sutton Maddock, Shifnal, Salop: **Third Prize**, 5*l.*, for his 1 year, 3 months, 2 weeks-old; bred by himself; sire, "John Evan's No. 11."

John Edward Farmer, Felton, Ludlow, Salop: the *Reserve Number*, to his 1 year, 4 months, 1 week-old; bred by himself.

Hampshire and other Short-woolled Shearling Rams.

Alfred Morrison, Fonthill House, Tisbury, Wilts: **First Prize**, 20*l.*, for his Hampshire Down, 1 year, 4 months, 3 weeks-old; bred by himself: and **Second Prize**, 10*l.*, for his Hampshire Down, 1 year, 4 months, 2 weeks-old; bred by himself.

Henry Lambert, Abington Park, Cambridge: the *Reserve Number*, to his Hampshire Down, about 1 year, 4 months-old; bred by Messrs. Russell, Horton Kirby, Dartford.

Hampshire and other Short-woolled Rams of any other Age.

John and Matthew Arnold, Westmeon, Petersfield, Hants: **First Prize**, 20*l.*, for their Hampshire Down, "Lord Salisbury," 2 years, 5 months-old; bred by themselves; sire, "Bandy Bulbridge."

Henry Lambert, Abington Park, Cambridge: **Second Prize**, 10*l.*, for his Hampshire Down, about 2 years, 4 months-old; bred by Messrs. Russell, Horton Kirby, Dartford.

Alfred Morrison, Fonthill House, Tisbury, Wilts: **Third Prize**, 5*l.*, for his Hampshire Down, 2 years, 4 months, 3 weeks-old; bred by himself.

Hampshire and other Short-woolled Shearling Ewes, Pens of Five.

John A. and Thomas Palmer, Cliddesden, Basingstoke, Hants: **First Prize**, 15*l.*, for their Hampshire Down, 1 year, 6 months-old; bred by themselves.

Jonathan Rigg, Wrotham Hill Park, Sevenoaks, Kent: **Second Prize**, 10*l.*, for his Hampshire Down, 1 year, 5 months, 1 week-old; bred by himself.

William Parsons, Monk Sherborne, Basingstoke, Hampshire: **Third Prize**, 5*l.*, for his Hampshire Down, 1 year, 4 months, 3 weeks-old; bred by himself.

HENRY LAMBERT, Abington Park, Cambridge: the *Reserve Number*, to his Hampshire Down, 1 year, 4 months, 2 weeks-old; bred by himself.

*Cheviot Shearling Rams.**

THOMAS ELLIOTT, Hindhope, Jedburgh, Roxburghshire: FIRST PRIZE, 10*l.*, for his 1 year, 2 months, 2 weeks-old; bred by himself.

ROBERT SHORTREED, Attonburn, Kelso, Roxburghshire: SECOND PRIZE, 5*l.*, for his 1 year, 2 months, 3 weeks-old; bred by himself.

JOHN ROBSON, Birness, Otterburn, Northumberland: THIRD PRIZE, 3*l.*, for "Masterpiece," 1 year, 3 months-old; bred by himself; sire, "Horny:" and the *Reserve Number*, to his 1 year, 3 months-old; bred by himself.

*Cheviot Rams of any other age.**

THOMAS ELLIOTT, Hindhope, Jedburgh, Roxburghshire: FIRST PRIZE, 10*l.*, for his 3 years, 2 months, 2 weeks-old; bred by himself: and SECOND PRIZE, 5*l.*, for his 3 years, 2 months, 2 weeks-old; bred by himself.

JOHN ROBSON, Birness, Otterburn, Northumberland: THIRD PRIZE, 3*l.*, for "The Nobleman," 2 years, 3 months-old; bred by himself; sire, "The Gentleman:" and the *Reserve Number*, to "Horny," 3 years, 2 months, 2 weeks-old; bred by himself; sire, "The Gentleman."

*Cheviot Shearling Ewes, Pens of Five.**

THOMAS ELLIOTT, Hindhope, Jedburgh, Roxburghshire: FIRST PRIZE, 10*l.*, for his 1 year, 2 months, 2 weeks-old; bred by himself.

JOHN ROBSON, Birness, Otterburn, Northumberland: SECOND PRIZE, 5*l.*, for his 1 year, 2 months, 2 weeks-old; bred by himself; sire, "Horny."

*Blackfaced Mountain Shearling Rams.**

WILLIAM HINDSON, Sleddale Hall, Shap, Westmoreland: FIRST PRIZE, 10*l.*, for "Prince," 1 year, 3 months-old; bred by Mr. G. Carruthers, Gale Hall, Penrith.

CHRISTOPHER ARMSTRONG, Ashgillside, Alston, Cumberland: SECOND PRIZE, 5*l.*, for "Mountain Heather," 1 year, 2 months, 2 weeks-old; bred by himself.

*Blackfaced Mountain Rams of any other Age.**

WILLIAM HINDSON, Sleddale Hall, Shap, Westmoreland: FIRST PRIZE, 10*l.*, for "Bishop," 4 years, 3 months-old; breeder unknown.

CHRISTOPHER ARMSTRONG, Ashgillside, Alston, Cumberland: SECOND PRIZE, 5*l.*, for "Champion," 2 years, 2 months, 2 weeks-old; bred by himself.

*Blackfaced Shearling Ewes, Pens of Five.**

CHRISTOPHER ARMSTRONG, Ashgillside, Alston, Cumberland: FIRST PRIZE, 10*l.*, for his 1 year, 2 months, 2 weeks-old; bred by himself.

*Herdwick Shearling Rams.**

EDWARD NELSON, Gatesgarth, Buttermere, Cockermouth, Cumberland: FIRST PRIZE, 10*l.*, for "Dark Eye," 1 year, 4 months-old; bred by himself; sire, "Toby Stuart."

George Browne, Troutbeck, Windermere, Westmoreland: **Second Prize**, 5*l.*, for his 1 year, 2 months, 2 weeks-old; bred by himself.

William Leathes, Lamplugh Hall, Cockermouth: the *Reserve Number*, to "Blakefell," 1 year, 2 months, 2 weeks-old; bred by himself.

*Herdwick Rams of any other Age.**

Edward Nelson, Gatesgarth, Buttermere, Cockermouth: **First Prize**, 10*l.*, for "Toby Stuart," 3 years, 2 months-old; bred by himself; sire, "Gatesgarth Boggle."

William Leathes, Lamplugh Hall: **Second Prize**, 5*l.*, for "Frederick," 3 years, 2 months, 2 weeks-old; bred by himself.

George Browne, Troutbeck: **Third Prize**, 3*l.*, for his 3 years, 2 months, 2 weeks-old; bred by himself.

*Herdwick Shearling Ewes, Pens of Five.**

George Browne, Troutbeck, Windermere: **First Prize**, 10*l.*, for his about 1 year, 2 months, 2 weeks-old; bred by himself.

Edward Nelson, Gatesgarth, Buttermere, Cockermouth: **Second Prize**, 5*l.*, for his 1 year, 1 month, 2 weeks-old; bred by himself.

*Lonk Shearling Rams.**

John Green and Son, Low House Farm, Silsden, near Leeds: **First Prize**, 10*l.*, for "Airedale Hero," 1 year, 3 months, 1 week-old; bred by Mr. J. Widdop, Howden, Leeds.

George Dewhurst, Townsend Fold Farm, Rawtenstall, Lancashire: **Second Prize**, 5*l.*, for his 1 year, 3 months, 1 week-old; bred by Mr. J. Smith, North Villa, Keighley.

*Lonk Rams of any other Age.**

John Green and Son, Low House Farm, Silsden, Leeds: **First Prize**, 10*l.*, for their 2 years, 2 months, 3 weeks-old; bred by Mr. J. M. Green, Blackhill, Keighley.

George Dewhurst, Townsend Fold Farm: **Second Prize**, 5*l.*, for his 3 years, 4 months-old; bred by himself.

*Lonk Shearling Ewes, Pens of Five.**

John Green and Son, Low House Farm: **First Prize**, 10*l.*, for their 1 year, 3 months-old; bred by themselves.

George Dewhurst, Townsend Fold Farm, Rawtenstall: **Second Prize**, 5*l.*, for his 1 year, 4 months-old; bred by himself.

*Carnarvon Shearling Rams.**

Griffith Jones, Wrexham Street, Mold, Flintshire: **First Prize**, 10*l.*, for "Prince," 1 year, 2 months, 3 weeks-old; bred by himself.

Edward Thomas, Pen isa-r' Waen, Trefnant, Flintshire: **Second Prize**, 5*l.* for his about 1 year, 3 months-old; bred by Mr. D. Roberts, Pentruffydd, Trefnant.

*Carnarvon Rams of any other Age.**

Thomas Roberts, Castell, Bangor, Carnarvonshire: **First Prize**, 10*l.*, for his 3 years, 2 months, 2 weeks-old; bred by Mr. R. Jones, Dolgam, Capel Curig.

Griffith Jones, Wrexham Street, Mold: **Second Prize**, 5*l.*, for "Sam," 3 years, 2 months, 2 weeks-old; bred by himself.

Edward Thomas, Pen isa-r' Waen: the *Reserve Number*, to his about 4 years 2 months-old; breeder unknown.

*Carnarvon Shearling Ewes, Pens of Five.**

Richard James, Duffryn Aur, Llanrwst, Denbigh: **First Prize**, 10*l.*, for his 1 year, 4 months-old; bred by himself: and **Second Prize**, 5*l.*, for his 1 year, 4 weeks-old; bred by himself.

Griffith Jones, Wrexham Street, Mold: the *Reserve Number*, to his 1 year, 2 months, 2 weeks-old; bred by himself.

PIGS.

Large White Breed—Boars above Twelve Months old.

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 10*l.*, for his boar; age and breeder unknown.

Richard Elmhirst Duckering, Northorpe: **Second Prize**, 5*l.*, for "Cultivator," 3 years, 1 month, 3 weeks-old; bred by himself.

The Earl of Ellesmere, Worsley Hall: the *Reserve Number*, to his boar; age and breeder unknown.

Large White Breed—Pens of Three Breeding Sow Pigs.

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 10*l.*, for his 5 months, 3 weeks, 4 days-old; bred by himself; sire, "Young Madman;" dam, "Lancashire Lass:" and **Second Prize**, 5*l.*, for his 5 months, 3 weeks, 4 days-old; bred by himself; sire, "Young Madman;" dam, "Lancashire Lass."

John Godfrey, Wigston Parva, Hinckley, Leicestershire: the *Reserve Number*, to his 5 months, 3 weeks, 3 days-old; bred by himself; dam, "Car Head."

Large White Breed—Breeding Sows.

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 10*l.*, for his breeding sow; age and breeder unknown: and **Second Prize**, 5*l.*, for his 1 year, 10 months, 3 weeks 3 days-old; bred by himself; sire, "Old Madman;" dam by "Yorkshire Hero."

Peter Eden, Cross Lane, Salford, Manchester: the *Reserve Number*, to "Gipsy," 2 years, 6 months, 5 days-old; bred by himself; sire, "Game Boy;" dam, "Sister to Acorn," by "John Bull."

Small White Breed—Boars above Six and not exceeding Twelve Months old.

THE EARL OF ELLESMERE, Worsley Hall, Manchester: FIRST PRIZE, 10*l.*, for his 11 months, 3 weeks, 4 days-old; bred by himself; sire, "XL," dam, "Queen of Worsley."

LIEUTENANT-COLONEL BRYAN G. D. COOKE, Colomendy, Mold: SECOND PRIZE, 5*l.*, for "Emperor," 10 months, 5 days-old; bred by himself; sire, "Little John;" dam, "Cestria.'

THOMAS NICHOLSON, 100, Lowther Street, Groves, York: the *Reserve Number*, to "King Lear," 10 months, 3 weeks-old; bred by himself; sire, "Fair Play;" dam, "Duchess."

Small White Breed—Boars above Twelve Months old.

THE EARL OF ELLESMERE, Worsley Hall, Manchester: FIRST PRIZE, 10*l.*, for his 1 year, 10 months-old; bred by himself; sire, "XL;" dam, by "Gamecock:" and SECOND PRIZE, 5*l.*, for his 3 years-old; bred by himself.

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton Lindsey: the *Reserve Number*, to "Bruce," 1 year, 9 months, 3 weeks, 2 days-old; bred by himself.

Small White Breed—Pens of Three Breeding Sow Pigs.

THE EARL OF RADNOR, Coleshill House, Highworth, Wilts: FIRST PRIZE, 10*l.*, for his 4 months, 1 week, 4 days-old; bred by himself; sire, "Warwick;" dam, "Cathrane," by "Coleshill."

ARTHUR CARDEN LOCKWOOD, Chester: SECOND PRIZE, 5*l.*, for his 5 months, 2 weeks, 4 days-old; bred by himself.

THE EARL OF ELLESMERE, Worsley Hall, Manchester: the *Reserve Number*, to his 5 months, 2 weeks, 4 days-old; bred by himself; sire, "Young XL;" dam, "Pride of the Village."

Small White Breed—Breeding Sows.

RICHARD ELMHIRST DUCKERING, Northorpe, Kirton Lindsey, Lincolnshire: FIRST PRIZE, 10*l.*, for "Princess," 2 years, 10 months, 2 weeks-old; bred by himself.

THE EARL OF ELLESMERE, Worsley Hall, Manchester: SECOND PRIZE, 5*l.*, for his 1 year, 4 months, 3 days-old, in-pig; bred by himself; sire, "XL;" dam, "Beauty:" and the *Reserve Number*, to his 1 year, 10 months, 2 weeks, 3 days-old; bred by himself; sire, "Prince;" dam, "Princess."

Small Black Breed—Boars above Six and not exceeding Twelve Months old.

GEORGE MUMFORD SEXTON, Wherstead Hall, Ipswich, Suffolk: FIRST PRIZE, 10*l.*, for "Topsawyer," 10 months, 1 day-old; bred by himself; sire, "Prodigal;" dam, "Sister to Lady Love," by "Gladiateur:" and SECOND PRIZE, 5*l.*, for "King of Trumps," 11 months, 6 days-old; bred by himself; sire, "King of Diamonds;" dam, "Spinaway," by "Blair Athol."

Thomas Comber, Redcliffe, Newton-le-Willows, Lancashire: the *Reserve Number*, to his 11 months, 1 week-old; bred by himself; sire, "Enchanter;" dam, "Star of Evening 5th," by "The Padre."

Small Black Breed—Boars above Twelve Months old.

George Mumford Sexton, Wherstead Hall, Ipswich: **First Prize**, 10*l.*, for "Silvio," 2 years, 1 week, 4 days-old; bred by himself; sire, "Blair Athol;" dam, "Black Diamond Again."

Small Black Breed—Pens of Three Breeding Sow Pigs.

George Mumford Sexton, Wherstead Hall, Ipswich: **First Prize**, 10*l.*, for "Admirable," "Beautiful," and "Perfect," 4 months, 3 weeks, 4 days-old; bred by himself; sire, "Prodigal;" dam, "Victoria," by "Blair Athol."

Small Black Breed—Breeding Sows.

The Earl of Ellesmere, Worsley Hall, Manchester: **First Prize**, 10*l.*, for his 1 year, 6 months-old; bred by Mr. Sexton, Wherstead Hall, Ipswich.

Thomas Comber, Redcliffe, Newton-le-Willows: **Second Prize**, 5*l.*, for "Star of Evening 7th," 1 year, 1 month, 3 days-old, in-pig; bred by himself; sire, "The Padre;" dam, "Star of Evening 7th," by "The Parson."

George Mumford Sexton, Wherstead Hall, Ipswich: the *Reserve Number*, to "Lady Golightly," 1 year, 4 months, 6 days-old; bred by himself; sire, "Prince Charlie;" dam, "Apology," by "Adventurer."

Berkshire Breed—Boars above Six and under Twelve Months old.

Arthur Stewart, Saint Bridge Farm, Gloucester: **First Prize**, 10*l.*, for "Crown Prince 4th," 9 months, 3 weeks, 5 days-old; bred by himself; sire, "Royal;" dam, "Princess," by "Sampson."

Sir Nicholas W. Throckmorton, Bart., Buckland, Faringdon, Berkshire: **Second Prize**, 5*l.*, for his 11 months, 3 weeks, 1 day-old; bred by himself; sire, "Pudgson;" dam, "Sleeping Bess," by "Hewer."

Heber Humfrey, Kingstone Farm, Shrivenham, Berks: the *Reserve Number*, to "Mayfair," 8 months, 3 weeks, 6 days-old; bred by himself; sire, "Mayflower;" dam, "No. 446 B," by "Tannerson."

Berkshire Breed—Boars above Twelve Months old.

William Hewer, Sevenhampton, Highworth, Wiltshire: **First Prize**, 10*l.*, for "Hopewell," 1 year, 6 months, 4 days-old; bred by himself; sire, "Union Jack 2nd;" dam, "Hyacinth," by "Wallace."

Heber Humfrey, Kingstone Farm, Shrivenham: **Second Prize**, 5*l.*, for "Windermere," 2 years, 3 weeks, 3 days-old; bred by himself; sire, "Smithereen;" dam, "Countess Gloucester," by "Lovely Brother."

William Hewer, Sevenhampton: the *Reserve Number*, to "Unison," 1 year, 2 months, 5 days-old; bred by himself; sire, "Union Jack 2nd;" dam, "Fashion" by "Wallace."

Berkshire Breed—Pens of Three Breeding Sow Pigs.

Benjamin St. John Ackers, Prinknash Park, Painswick, Gloucestershire: First Prize, 10*l.*, for his 5 months, 1 week, 5 days-old; bred by himself; sire, "Hesperian Major;" dam, "Fair Flora," by "Blacksmith 2nd."

Berkshire Breed—Breeding Sows.

Lord Clermont, Ravensdale Park, Newry, Ireland: First Prize, 10*l.*, for his 1 year, 1 week, 4 days-old, in-pig; bred by himself; dam, "Kate," by "Irish Blacksmith 2nd:" and Second Prize, 5*l.*, for "Octoroon 4th," 1 year, 4 months, 6 days-old, in-pig; bred by himself; sire, "Irish Blacksmith;" dam, "Octoroon 3rd," by "Joe Hogg."

Sir Nicholas W. Throckmorton, Bart., Buckland, Faringdon, Berks: the *Reserve Number*, to his 1 year, 3 months, 1 week, 6 days-old, in-pig; bred by himself; sire, "Pudgson;" dam, "Queen."

Other Breeds—Boars above Six and under Twelve Months old.

The Earl of Ellesmere, Worsley Hall, Manchester: First Prize, 10*l.*, for his middle breed, white, 11 months, 3 weeks, 5 days-old; bred by himself; sire, "Wonder;" dam, by "Pride of Idle."

Other Breeds—Boars above Twelve Months old.

Samuel Wilson, jun., Tanner's Farm, Ramsbottom, Lancashire: First Prize, 10*l.*, for "Bill," middle breed, white, age not known; bred by Mr. W. Hatton, Adingham, Yorkshire.

Peter Eden, Cross Lane, Salford, Manchester: Second Prize, 5*l.*, for "Prince the 3rd" middle, white, 2 years, 11 months-old; bred by himself; sire, "Young Prince;" dam, by "Old Prince": and the *Reserve Number*, to "Star of the East," middle breed, white with spots, 1 year, 10 months-old; bred by himself; sire, "King;" dam, "Sunrise," by "Major."

Other Breeds—Pens of Three Breeding Sow Pigs.

Richard Elmhirst Duckering, Northorpe, Kirton Lindsey: First Prize, 10*l.*, for his Improved Lincolnshire, white, 5 months, 3 weeks, 6 days-old; bred by himself.

Other Breeds—Breeding Sows.

The Earl of Ellesmere, Worsley Hall, Manchester: First Prize, 10*l.*, for his middle breed, white, age and breeder unknown.

Peter Eden, Cross Lane, Salford, Manchester: Second Prize, 5*l.*, for his "Queen," middle breed, white, with spots, 1 year, 11 months, 2 weeks, 2 days-old; bred by Mr. H. Neild, the Grange Farm, Worsley, Manchester; sire, "The Baron;" dam, "Lady Worsley," by "Velocipede:" and the *Reserve Number*, to "Shelf," middle breed, white, age and breeder unknown.

BUTTER.*

Firkin of fresh.

William Foden, 65 Regent Road, Salford: First Prize, 5*l.*,

George Finch Jackson, Hatton, Chester: Second Prize, 3*l.*

William Foden, 65 Regent Road, Salford: Third Prize, 2*l.*

Pot or Crock of Welsh.

Miss Jane Lloyd, Rhuallt, St. Asaph: First Prize, 5*l.*

Thomas Owen, Hendy, Carnarvon: Second Prize, 3*l.*

Edward Humphreys, Royal Hotel, Carnarvon, Third Prize, 2*l.*

Pot or Crock of English.

John Marson, Acton Trussell, Stafford: First Prize, 5*l.*

Thomas P. Lyon, Appleton Hall, Warrington: Second Prize, 3*l.*

William Sheraton, Broom House, Ellesmere: Third Prize, 2*l.*

Firkin, Crock, or Package of Canadian, American or Foreign.

Burgon and Co., Oxford Road, Manchester: First Prize, 5*l.*

William Foden, 65, Regent Road, Salford: Second Prize, 3*l.*; and Third Prize, 2*l.*

Six Pounds of fresh.

Charles Joseph Butcher, Willaston, Chester: First Prize, 6*l.*, and Gold Medal to the Dairymaid.

William Pitt Miller, Merlewood, Grange-over-Sands: Second Prize, 5*l.*

William Parker, Great Stanney Hall, Chester: Third Prize, 4*l.*

Lord Chesham, Latimer, Chesham: Fourth Prize, 3*l.*

CHEESE.*

Cheshire—Three Cheeses above Fifty pounds weight each, coloured or plain.

William Dudleston, Donnington, Newport, Salop: First Prize, 20*l.*

Charles Hilditch, Wardle Old Hall, Nantwich: Second Prize, 15*l.*

George Cross, Sandiway, Northwich: Third Prize, 10*l.*

Cheshire—Three Cheeses under Fifty pounds weight each, coloured or plain.

William Dudleston, Donnington, Newport, Salop: First Prize, 15*l.*, and Gold Medal for the best lot of Cheese in any of the Classes.

Thomas Hodson Hodson, Edleston Farm, Nantwich: **Second Prize**, 10*l.*

Elizabeth Williamson, Wallstone Farm, Chorley, Nantwich: **Third Prize**, 5*l.*

Lancashire—Three Cheeses, any weight, coloured or plain.

William Kirby, Roseacre, Kirkham: **First Prize**, 20*l.*

Joseph Haydock, Swift's House, Heskin, Chorley: **Second Prize**, 15*l.*

Samuel Salthouse, Roseacre, Kirkham: **Third Prize**, 10*l.*

Any other British Make—Three Cheeses above Fifty pounds weight each.

John Smith, Neepdown Farm, Thornbury, Gloucestershire: **First Prize**, 15*l.*

W. and T. Allen, Crookwood, Erckfort, Devizes: **Second Prize**, 10*l.*

George Gibbons, Tunley Farm, Bath: **Third Prize**, 5*l.*

Any other British Make—Three Cheeses above Twenty and under Fifty pounds weight each.

William T. Carrington, Croxden Abbey, Uttoxeter: **First Prize**, 15*l.*

Joseph Haydock, Swift's House, Heskin, Chorley: **Second Prize**, 10*l.*

Aldford Cheese Factory Association, Aldford, Chester: **Third Prize**, 6*l.*

Canadian, American, or Foreign—Three Cheeses above Forty pounds weight each, coloured or plain.

Hodgson Brothers, 14, Button Street, Liverpool: **First Prize**, 20*l.*; and **Second Prize**, 15*l.*

Watson, Dunn and Co., Victoria Street, Liverpool: **Third Prize**, 10*l.*

HAMS AND BACON.*

Six British Hams.

Joseph Kendall, 25, Tancred Road, Liverpool: **First Prize**, 20*l.*

Steen Brothers, Froyle Street, Londonderry, Ireland: **Second Prize**, 15*l.*

Six Canadian, American, or Foreign Hams.

John Taylor Davies, Liverpool: **First Prize**, 20*l.*; and **Second Prize**, 15*l.*

Henry Thompson, 9, Elliott Street, Liverpool: **Third Prize**, 10*l.*

Three Sides of British Bacon.

Henry Thompson, 9, Elliot Street, Liverpool: **Second Prize**, 15*l.*

Joseph Kendall, 25, Tancred Road, Liverpool: **Third Prize**, 10*l.*

Three Sides of Canadian, American, or Foreign Bacon.

John Taylor Davies, Liverpool: **First Prize**, 20*l.*; and **Second Prize**, 15*l.*

John Morrell, Morelands, Birkdale Park, Southport: **Third Prize**, 10*l.*

FARM PRIZES.*

For the best-managed Farms in Lancashire, Cheshire, Denbighshire, Flintshire.

SECTION I.—ARABLE FARMS with at least two-thirds of their area under rotation of cropping.

CLASS 1.—*Farms of one hundred and fifty acres and upwards in extent.*

MRS. HELEN BIRCH, Netherton, Aintree, Liverpool: PRIZE of 50*l.*

CLASS 2.—*Farms above eighty acres in extent, and under one hundred and fifty acres.*

SAMUEL COOK, Linacre Village, Liverpool: FIRST PRIZE, 40*l.*

THOMAS WILLIAMSON, Linacre, Liverpool: SECOND PRIZE, 20*l.*

CLASS 3.—*Farms above forty acres in extent, and under eighty acres.*

HUGH AINSCOUGH, Banks, Southport: PRIZE, 20*l.*

SECTION II.—DAIRY OR STOCK FARMS where the course of cultivation is chiefly directed to the production of cheese or butter, or of animal food.

CLASS 4.—*Farms of not less than two hundred acres in extent.*

JOHN LEA, Stapleford Hall, Chester: PRIZE, 50*l.*

JOHN ROBERTS, Well House, Saltney, Chester: PRIZE, 50*l.*

JOSEPH ROBINSON, Lee Green Hall, Middlewich: *Commended.*

JAMES KENDALL, Harborrow, Ulverston: *Commended.*

CLASS 5.—*Farms of not less than one hundred acres and under two hundred acres.*

RICHARD MACKERETH, Waterside Farm, Ashton-with-Stodday: FIRST PRIZE, 40*l.*

CHARLES HOLLINSHEAD, Weaver Bank, Minshull-Vernon, Middlewich: SECOND PRIZE, 20*l.*

PETER PERCIVAL, Daresbury, Warrington: *Commended.*

CLASS 6.—*Farms of not less than fifty but under one hundred acres.*

WILLIAM EDWARDS, Penrhos, Ruthin: PRIZE, 20*l.*

JOHN GREGORY, Waverton, Chester: *Commended.*

SECTION III.—FARMS in the Isle of Man.

CLASS 7.—*Farms of seventy acres or upwards in extent.*

THOMAS FARQHAR, White Stone House, Castletown: PRIZE, 25*l.*

CLASS 8.—*Farms under seventy acres in extent, but not less than twenty-five acres.*

JOHN TEARSE, Ballanedin, Ramsey: PRIZE, 15*l.*

IMPLEMENTS.

The Gold Medal of the Society, offered for an efficient Sheaf-binding Machine, either attached to a Reaper or otherwise.

The Judges report that having made a careful and thorough examination of the American Sheaf-binding Machines, which were tried on wheat and oats on Mr. Scotson's farm at Aigburth, they are of opinion that whilst great credit is due to the three inventions, viz., those of Walter A. Wood, D. M. Osborne and Co., and C. H. McCormick, for the considerable efficiency attained, none of them have, as regards the requirements of English farmers, attained that perfection which would justify them in awarding the Gold Medal of the Society. They, however, strongly recommend that a SILVER MEDAL be awarded to Walter A. Wood as a recognition of Progress, and that *high commendation* be bestowed on the binding mechanism employed by D. M. Osborne and Co.

Believing in the great importance of this invention, when made practically efficient, they were glad to know that the Society proposed to continue their offer of a Gold Medal for an efficient Self-binder.

The recommendation of the Judges has been adopted by the Stewards.

MISCELLANEOUS AWARDS.

SILVER MEDALS.

W. N. NICHOLSON AND SON, for their Patent Grist Mill.

HODGKIN, NEUHAUS, AND CO., for their New Patent Boiler-Feeder.

CLAYTON AND SHUTTLEWORTH, for their New Patent Drum-Guard on Threshing Machine.

AGRICULTURAL EDUCATION.

Senior Examination Papers, 1877.

EXAMINATION IN AGRICULTURE.

Maximum Number of Marks, 200. Pass Number, 100.

Tuesday, April 17th, from 10 *a.m. till* 1 *p.m.*

1. In selecting for your own agreeable and profitable occupation a mixed farm of say 400 acres, what proportion of arable, meadow, and grass land would you adopt, and what other considerations would mainly guide you?

2. Mention some of the conditions occurring in most farm-agreements, and note any that you consider might be modified or left out without injury to the farm.

3. Furnish a list of the field-implements required on a large mixed farm, stating the numbers and price of each.

4. Give a list of the grasses and clovers commonly used for 1, 2, or 3 years' lay, with the quantity and price per acre of each.

5. In seeding down land for permanent grass or meadow, what additions would you make to the before-named mixture? (Botanical as well as English names should be given.)

6. What are the three most important ingredients of every good turnip manure? and how much per acre, of each, would you apply where no farmyard-dung can be spared?

7. Mention, in monthly succession (beginning with October), the operations common on a mixed farm throughout the year.

8. Describe, briefly, the preparation of a field for swedes, and at about what date would you sow the seed?

9. Draw, roughly, on a scale of 8 feet to an inch, the ground-plan of a spacious and convenient single byre for 12 cows, showing draining, and the communications with adjoining offices. And mention the leading points to be kept in view in designing all *first-class* farm buildings?

10. Mention 12 leading points of a well-made Shorthorn cow.

11. Describe the treatment of Shorthorn heifers from birth until they drop the first calf, stating age at which this last event may take place.

12. Your home-bread fattening sheep, at say one year old, may average 10½ stone each, *live-weight*; at how much would you estimate the *carcass-weight*, and what would they realise per head at 6*s*. 10*d*. per Smithfield stone?

13. Mention the several classes of improvements recognised by the "Agricultural Holdings (England) Act, 1875."

14. You wish, as much for shelter as for ornament, to fence off and plant, in a 100-acre pasture, *four* clumps of trees, each to contain ¾ of an imperial acre. Of what *shape* would you construct them in order to take least fencing, and what would it cost you to rail off the whole four at 8*s*. per rood of 7 yards.

15. Define the term "manure."

16. On what soils and in what situations is steam cultivation most to be recommended? and what are its main advantages as compared with team-work?

17. At 8*d*. per head per week, eaten on the ground by sheep, what would you expect to realise per acre from a crop of swedes and common turnips respectively?

18. What soils do you reckon most suitable for the growth, respectively, of swedes, white turnips, and mangold-wurzel? and what weight per acre is considered a good crop?

EXAMINATION IN CHEMISTRY.

Maximum Number of Marks, 200. Pass Number, 100.

I. General Chemistry.

Wednesday, April 18*th, from* 10 *a.m. till* 1 *p.m.*

1. What compounds does carbon form with oxygen, and under what circumstances are they severally formed? Describe the chief characters of each of these compounds, and explain how its composition has been determined.

2. Describe the preparation and chief properties of chlorine. Explain its action on (1) potash, (2) ferrous sulphate, (3) alcohol.

3. Define equivalent weights, also neutral salts; and illustrate your definitions by examples. Find how much lead nitrate will exactly decompose 100 grs. of common sodium phosphate.

(N : P : Na : Pb = 14 : 31 : 23 : 207.)

4. Point out the several sources whence nitrates in spring-water are derived, explaining how they are produced in each case. In what cases is spring-water most liable to be contaminated by passing through leaden pipes, and why?

5. State the composition of silica. How can it be rendered soluble in water? Mention some of the minerals of common occurrence which consist of silica, and others which are silicates; and state which of them are subject to decomposition by exposure to the weather, and what is the general character of such decomposition.

6. By what characters can you distinguish salts of lime from those of magnesia? Of the common salts of magnesia, which are soluble and which insoluble in water? Compare the properties of magnesian limestone (under the action of fire, atmosphere, and chemical reagents) with those of common limestone, explaining the chemistry of the action in each case.

7. What are the chief sources of ammonia? In what respects do salts of ammonia resemble those of potassium? Compare the composition of corresponding salts of these two substances. Explain how to find the amount of ammonia present in a mixture containing salts of potash and soda as well as ammonia.

8. State the composition of potassium ferrocyanide, how it is prepared, to what uses and in what manner it is applied.

9. In what parts of plants is albumen found? What are the chief chemical characters of albumen? Of what elements is it composed, and how can you demonstrate the presence of each of these elements in it?

II. AGRICULTURAL CHEMISTRY.

Wednesday, April 18th, from 2 p.m. till 5 p.m.

1. What are the chemical characters of the drainage of dung-heaps?

2. Describe the changes which Farmyard-Manure undergoes in rotting. Point out the difference in the composition of fresh and rotten dung, and the means of preventing loss in fertilising matters in keeping Farmyard-Manure.

3. How do you ascertain whether or not land is likely to be benefited by Lime? In what forms is Lime used in agriculture?

4. Mention some of the causes of sterility of soils, and the means of removing them.

5. Point out the principal differences in the feeding and manuring properties of Linseed-cake, decorticated and undecorticated Cotton-cake.

6. How can you readily detect whether or not Rape-cake is fit for feeding purposes?

7. What is the composition of Milk? How do you detect adulterations in Milk? How is condensed Milk prepared?

8. Write a short paper on the comparative fertilising value of Nitrogen in the form of Dried Blood, Shoddy, Rape-cake, Leather-refuse, Sulphate of Ammonia, and Nitrate of Soda.

9. Describe a good method of analysing Dissolved Bones, and the manner in which the money value of Dissolved Bones and Mineral Superphosphate may be ascertained.

EXAMINATION IN MECHANICS AND NATURAL PHILOSOPHY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

Thursday, April 19*th, from* 10 *a.m. till* 1 *p.m.*

1. Explain a method of finding the centre of gravity of a body, which consists of two parts, whose weights and centres of gravity (severally) are known. When men raise a long ladder from a horizontal to a vertical position, one of them will stand upon the lowest rung, and hold on. How does his doing so help the others?

2. What are the rectangular components of a force? A string is tied by one end to a point on the ground, and pulled with a force of 100lbs.; the string is observed to be inclined at an angle of 22° 30′ to the horizon; what force is exerted by the pull on the point in a vertical, and what in a horizontal direction?

3. A block of stone 4ft. square and 10ft. high stands on a horizontal plane; it is pulled at top by a force whose direction bisects two of its parallel horizontal edges; for what amount will the force be just on the point of making the block topple over; and what will be the magnitude and direction of the total pressure on the ground? The specific gravity of the stone is 2.75.

4. Show how to find the relation between the power and the weight in a single movable pulley, when the parts of the rope supporting the pulley are inclined to each other at a given angle.

If the angle is 135°, and the weight 2 cwts., what is the power?

5. What is a foot-pound? When does an agent work with one-horse power?

A body weighing 1000 lbs. is drawn along a horizontal plane by an agent working at the rate of 11,000 foot-pounds a minute, it is found to move uniformly at the rate of 2¼ miles an hour; what is the friction per lb. between the body and the plane?

6. Write down the formulæ connecting the distance described, and the velocity acquired, in a given time by a body whose motion is uniformly accelerated. Explain these formulæ, without giving a formal proof of them.

A body moves from rest; its velocity undergoes a uniform acceleration of 32 in feet and seconds; find the distance it describes in the seventh second of its motion.

7. Two weights of 130 lbs. and 110 lbs. are connected by a fine thread, which passes over a small pulley turning on a very smooth axle; the heavier weight is allowed to descend, drawing up the lighter weight; at what rate per second are they moving at the end of the third second of the motion? What is the magnitude of the tension of the thread?

8. State the law of the transmission of pressure through water; explain the construction of the hydraulic press sufficiently to exemplify this law.

Describe the leather collar by means of which the press is enabled to work water-tight.

9. What is the dew-point?

By what simple experiment could you show that on a fine summer day the air contains moisture?

Speaking generally, does the air contain more moisture in summer than in winter? Give briefly a reason for your answer.

EXAMINATION IN MENSURATION AND SURVEYING.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Thursday, April 19th, from 2 p.m. till 5 p.m.

1. State the rules for finding (*a*) the area of a quadrilateral figure with two sides parallel; (*b*) the area of a circle; (*c*) the area of the surface of a cylinder; (*d*) the volume of a pyramid or cone.

2. A B C D is a quadrilateral figure; the side A B is parallel to and shorter than the side C D: show how to draw through A a line dividing the area into two equal parts.

3. A circular pipe 4 inches in diameter is found to deliver 200 gallons of water a minute; at what rate (in miles per hour) does the water move through the pipe? (A gallon contains 277,274 cubic inches.)

4. A square field of 40 acres has a border 30 feet wide trenched round it; what is the area of the border in square feet, (*a*) if it be inside the field, (*b*) if it be outside the field?

5. A large area is to be planted with trees in rows, so that from tree to tree may be 20 feet; what distance is there between any two consecutive rows, and how many square feet are allowed for each tree?

6. There are two trees, both on accessible ground, and in an open space, but with an obstacle, such as a cottage, between them; give a method of finding how far they are apart, without using any instrument for measuring angles.

7. Describe briefly the Theolodite, so far as the principle of its construction is concerned. What angles can be measured with it?

8. For a triangulation of a few square miles it is found convenient to measure a base on a road with a uniform ascent of 2 vertical to 25 horizontal: the measured distance on the road being 3745 feet, what would be the length of the base to be used in the triangulation?

9. Two sides of a triangle are 7584 feet and 5793 feet long; they contain an angle of 37° 10′; calculate the remaining angles and side.

10. A B C D are four points; from A to B is 4000 feet, from B to C 5000 feet, from C to D 4100 feet, from D to A 900 feet; the angle at A is a right angle; find the area of the quadrilateral.

EXAMINATION IN BOOK-KEEPING.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

Friday, April 20th, from 10 *a.m. till* 1 *p.m.*

Journalise and post into a ledger, in proper technical form and language, the following series of facts and transactions, and, from such ledger, make out a Trial Balance, a Profit and Loss Account, and a Balance Sheet.

Liabilities and Assets of W. FULLER *on 1st January,* 1877.

	£	s.	d.
LIABILITIES.			
Amount due to C. Mason	450	0	0
Do. W. Squires	220	0	0
Acceptance to R. Brown's Draft, due 22nd January	125	0	0
	£795	0	0
ASSETS.			
Cash at Banker's	1315	0	0
Petty Cash in hand	6	15	0
300 Sheep, valued at	450	0	0
50 Bullocks „	1000	0	0
Stock of Oil-cake, Provender, &c.	125	0	0
	£2,896	15	0

1877.		£	s.	d.
Jan. 1.	Bought of T. Archer, 60 Sheep for	105	0	0
„ 4.	Sold to S Dixon, 18 Bullocks for	450	0	0
„ 5.	Accepted C. Mason's Draft on me at 60 days' sight for	450	0	0
„ 10.	Purchased Lease of premises occupied by me, and paid for the same	500	0	0
„ 12.	Bought of W. Squires, 200 Sheep for ..	300	0	0
„ 14.	Sold to W. Rye, 45 Sheep for	90	0	0
„ 17.	Bought Oil-cake for Cash	28	0	0
	Bought of C. Mason, 20 Bullocks for ..	360	0	0
„ 21.	Sold to W. Morgan, 125 Sheep for	281	5	0
	Drew upon him at 30 days' sight for ..	280	0	0
	Allowed him	1	5	0
„ 22.	Drew on account of Petty Cash	10	0	0
	Paid T. Archer	105	0	0
„ 23.	Sold to S. Dixon, 20 Bullocks for	520	0	0
	Received of him, Cash	350	0	0
	Drew upon him at 60 days' sight for ..	500	0	0
„ 24.	Bought of C. Preston, 125 Sheep for	187	10	0
	Sold to W. Rye, 100 Sheep for	250	0	0
„ 25.	Paid R. Brown's Draft, due this day	125	0	0
	Drew Cash for private account	15	0	0
„ 26.	Consigned to W. Slade, 10 Bullocks, to be sold for my account and risk, valued at	225	0	0
	Paid for carriage of the above	15	0	0
„ 27.	Received of W. Rye, Cash	200	0	0
	Accepted C. Preston's Draft on me at 30 days' sight for	187	10	0
„ 30.	Received of W. Slade, account sales of Bullocks consigned to him, showing that the same had realised net	285	0	0
	Drew upon him at 10 days' sight for ..	285	0	0
„ 31.	Paid sundry expenses out of Petty Cash ..	11	18	6
	Paid for Wages	36	10	0
	Clerk's Salary, due this day	12	10	0
	Private account for interest on Capital ..	8	15	0
	Oil-cake and Provender on hand	45	0	0
	Sheep on hand	640	0	0
	Bullocks on hand	400	0	0
	Depreciation in value of Lease	2	10	0

EXAMINATION IN GEOLOGY.

Maximum Number of Marks, 100. Pass Number, 50.

Friday, April 20th, from 2 p.m. till 5 p.m.

1. Mention some of the chief agencies by which various kinds of rock have been formed. Give some examples.

2. State the advantages of a knowledge of Geology to the agriculturist.

3. What is the Boulder Clay? Explain its origin. How does it differ from other clay formations?

4. Explain how geological structure may be favourable or not to the water-supply of a district.

5. How are the Stratified rocks divided into great groups or periods? Give a sketch-map showing their general distribution in England and Wales.

6. Mention some fossils by which each of the great groups of Stratified rocks is distinguished.

7. Construct a table of the subdivisions of the Oolitic rocks, indicating the calcareous, arenaceous, and argillaceous beds.

8. By what different agencies have soils been formed? Give some classification of soils.

9. Define the term "warp." Describe its agricultural advantages, and give examples.

10. Why is it that the surface coloured as chalk on a geological map is not always of the same agricultural value?

11. What is the difference between Agricultural Geology and Surface Geology?

12. Name the rocks and fossils on the table.

EXAMINATION IN BOTANY.

[It is expected that Eight Questions at least will be answered.]

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Saturday, April 21st, from 10 *a.m. till* 1 *p.m.*

1. Explain the terms "endosmose" and "exosmose."

2. What is the function of the epidermis; and what plants are without it?

3. Explain the changes that take place in the food stored in the seed before it can be assimilated by the plant.

4. What is albumen? Mention two seeds in which albumen is present, and two which are destitute of it.

5. What is smut and mildew; and what actions would you take to prevent their attacking crops?

6. Give the principal groups (at least three) of dicotyledons, with the characters which distinguish them, and an example of each.

7. In which way do manures benefit plants?

8. Explain the morphology of the edible portions of the potato, onion, kohl-rabi and turnip.

9. Give an account of the nature and history of the potata fungus.

10. What plants of the Natural Order *Leguminosæ* are cultivated in Britain?

11. Under what conditions are the sexual organs of Ferns produced?

12. Describe in a systematic method the plants marked A, B, and C.

EXAMINATION IN ANATOMY AND ANIMAL PHYSIOLOGY.

Maximum Number of Marks, 100. Pass Number, 50.

Saturday, April 21st, from 2 p.m. till 5 p.m.

1. Describe the structure, form, size, and weight of the kidneys of the Ox, as compared with those of the Sheep. State the position which these organs occupy in relation to the viscera of the abdomen, and the membrane which lines that cavity. Enter fully into a description of their physiological function, and the influence which various kinds of food have upon urinary deposits.

2. Describe the position, size, and general structure of the liver of the Sheep. Name its chief function, and the effects produced by its secretion in the assimilation of the food. State also the ill consequences which are likely to attend the pasturing of Sheep on wet and undrained soils, especially during the summer months.

MEMORANDA.

Address of Letters.—The Society's office being situated in the postal district designated by the letter W, Members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

General Meeting in London, December, 1877.

General Meeting in London, May 22, 1878, at 12 o'clock.

Meeting at Bristol, July 1878.

Monthly Council (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

Adjournments.—The Council adjourn over Passion and Easter weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

Office Hours.—10 to 4. On Saturdays, 10 to 2.

Diseases of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society, and of sending animals to the Brown Institution, Wandsworth Road, S.W.—(A statement of these privileges will be found on page c)

Chemical Analysis.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in this Appendix (p. ci).

Botanical Privileges.—The Botanical and Entomological Privileges enjoyed by Members of the Society will be found stated in this Appendix (page ciii).

Subscriptions.—1. Annual.—The subscription of a Governor is £5, and that of a Member £1, due in advance on the 1st of January of each year, and becoming in arrear if unpaid by the 1st of June. 2. For Life.—Governors may compound for their subscription for future years by paying at once the sum of £50, and Members by paying £10. Governors and Members who have paid their annual subscription for 20 years or upwards, and whose subscriptions are not in arrear, may compound for future annual subscriptions, that of the current year inclusive, by a single payment of £25 for a Governor, and £5 for a Member.

Payments.—Subscriptions may be paid to the Secretary, in the most direct and satisfactory manner, either at the Office of the Society, No. 12, Hanover Square, London, W., or by means of post-office orders, to be obtained at any of the principal post-offices throughout the kingdom, and made payable to him at the Vere Street Office, London, W.; but any cheque on a banker's or any other house of business in London will be equally available, if made payable on demand. In obtaining post-office orders care should be taken to give the postmaster the correct initials and surname of the Secretary of the Society (H. M. Jenkins), otherwise the payment will be refused to him at the post-office on which such order has been obtained; and when remitting the money-orders it should be stated by whom, and on whose account, they are sent. Cheques should be made payable as drafts on demand (not as bills only payable after sight or a certain number of days after date), and should be drawn on a London (not on a local country) banker. When payment is made to the London and Westminster Bank, St. James's Square Branch, as the bankers of the Society, it will be desirable that the Secretary should be advised by letter of such payment, in order that the entry in the banker's book may be at once identified, and the amount posted to the credit of the proper party. No coin can be remitted by post, unless the letter be registered.

New Members.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary. Forms of Proposal may be obtained on application to the Secretary.

⁂ Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-laws, of a Statement of the General Objects, &c., of the Society, of Chemical, Botanical, and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Members' Veterinary Privileges.

I.—SERIOUS OR EXTENSIVE DISEASES.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that the Society's Veterinary Inspector should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l.* 2*s.* each day as a professional fee, and 1*l.* 1*s.* each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—ORDINARY OR OTHER CASES OF DISEASE.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l.* 2*s.* per diem, and travelling expenses. Applications should be addressed to the Superintendent of the Brown Institution, care of the Secretary of the Royal Agricultural Society, 12, Hanover Square, London, W.

III.—CONSULTATIONS WITHOUT VISIT.

Personal consultation with Veterinary Inspector	5*s.*
Consultation by letter	5*s.*
Consultation necessitating the writing of three or more letters	10*s.*
Post-mortem examination, and report thereon	10*s.*

A return of the number of applications from Members of the Society during each half-year is required from the Veterinary Inspector.

IV.—ADMISSION OF DISEASED ANIMALS TO THE BROWN INSTITUTION, WANDSWORTH ROAD, LONDON, S.W.; INVESTIGATIONS, LECTURES, AND REPORTS.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Brown Institution, on the following terms; viz., by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Professor-Superintendent according to circumstances."

No. 2. The Professor-Superintendent of the Institution has also undertaken to carry out such investigations relating to the nature, treatment, and prevention of diseases of cattle, sheep, and pigs, as may be deemed expedient by the Council.

No. 3. A detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary of the Institution, or on Farms in the occupation of Members of the Society, will be furnished to the Council quarterly; and also special reports from time to time on any matter of unusual interest which may come under the notice of the Institution.

By Order of the Council,
H. M. JENKINS, *Secretary.*

Members' Privileges of Chemical Analysis.

THE Council have fixed the following rates of Charges for Analyses to be made by the Consulting Chemist for the *bonâ fide* use of Members of the Society; who, to avoid all unnecessary correspondence, are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by Members at the time of their application.

No. 1.	—An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample)	5s.
„ 2.	—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia	10s.
„ 3.	—An estimate of the value (relatively to the average samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda	10s.
„ 4.	—An analysis of superphosphate of lime for soluble phosphates only	10s.
„ 5.	—An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia ..	£1.
„ 6.	—An analysis (sufficient for the determination of its agricultural value) of an ordinary artificial manure	£1.
„ 7.	—Limestone:—the proportion of lime, 7*s.* 6*d.*; the proportion of magnesia, 10*s.*; the proportion of lime and magnesia	15s.
„ 8.	—Limestone or marls, including carbonate, phosphate, and sulphate of lime and magnesia, with sand and clay ..	£1.
„ 9.	—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	£1.
„ 10.	—Complete analysis of a soil	£3
„ 11.	—An analysis of oil-cake or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate	£1.
„ 12.	—Analysis of any vegetable product	£1.
„ 13.	—Analysis of animal products, refuse substances used for manure, &c.	from 10s. to 30s.
„ 14.	—Determination of the "hardness" of a sample of water before and after boiling	10s.
„ 15.	—Analysis of water of land drainage, and of water used for irrigation	£2.
„ 16.	—Determination of nitric acid in a sample of water	£1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. AUGUSTUS VOELCKER, F.R.S., 11, Salisbury Square, Fleet Street, London, E.C., to which he requests that all letters and parcels (Postage and Carriage paid) should be directed.

By Order of the Council,
H. M. JENKINS, *Secretary.*

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

ARTIFICIAL MANURES.—Take a large handful of the manure from three or four bags, mix the whole on a large sheet of paper, breaking down with the hand any lumps present, and fold up in tinfoil, or in oil silk, about 3 oz. of the well-mixed sample, and send it to 11, SALISBURY SQUARE, FLEET STREET, E.C., by post: or place the mixed manure in a small wooden or tin box, which may be tied by string, but must not be sealed, and send it by post. If the manure be very wet and lumpy, a larger boxful, weighing from 10 to 12 oz., should be sent either by post or railway.

Samples not exceeding 4 oz. in weight may be sent by post, by attaching two penny postage stamps to the parcel.

Samples not exceeding 8 oz., for three postage stamps.

Samples not exceeding 12 oz., for four postage stamps.

The parcels should be addressed: DR. AUGUSTUS VOELCKER, 11, SALISBURY SQUARE, FLEET STREET, LONDON, E.C., and the address of the sender or the number or mark of the article be stated on parcels.

The samples may be sent in covers, or in boxes, bags of linen or other materials. No parcel sent by post must exceed 12 oz. in weight, 1 foot 6 inches in length, 9 inches in width, and 6 inches in depth.

SOILS.—Have a wooden box made 6 inches long and wide, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil with its subsoil from 9 to 12 inches deep; trim this block or plan of the field to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid and send it by goods or parcel to the laboratory. The soil will then be received in the exact position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

WATERS.—Two gallons of water are required for analysis. The water, if possible, should be sent in glass-stoppered Winchester half-gallon bottles, which are readily obtained in any chemist and druggist's shop. If Winchester bottles cannot be procured, the water may be sent in perfectly clean new stoneware spirit-jars surrounded by wickerwork. For the determination of the degree of hardness before and after boiling, only one quart wine-bottle full of water is required.

LIMESTONES, MARLS, IRONSTONES, AND OTHER MINERALS.—Whole pieces, weighing from 3 to 4 oz., should be sent enclosed in small linen bags, or wrapped in paper. Postage 2*d.*, if under 4 oz.

OILCAKES.—Take a sample from the middle of the cake. To this end break a whole cake into two. Then break off a piece from the end where the two halves were joined together, and wrap it in paper, leaving the ends open, and send parcel by post. The piece should weigh from 10 to 12 oz. Postage, 4*d.* If sent by railway, one quarter or half a cake should be forwarded.

FEEDING MEALS.—About 3 oz. will be sufficient for analysis. Enclose the meal in a small linen bag. Send it by post.

On forwarding samples, separate letters should be sent to the laboratory, specifying the nature of the information required, and, if possible, the object in view.

H. M. JENKINS, *Secretary.*

Members' Botanical and Entomological Privileges.

The Council have fixed the following Rates of Charge for the examination of Plants, Seeds, and Insects for the *bonâ fide* use of Members of the Society, who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined Schedule. The charge for examination must be paid to the Consulting Botanist at the time of application, and the carriage of all parcels must be prepaid.

I. BOTANICAL.

No. 1.	—A report on the purity, amount and nature of foreign materials, perfectness, and germinating power of a sample of seeds	5s.
„ 2.	—Detailed report on the weight, purity, perfectness, and germinating power of a sample of seeds, with a special description of the weeds and other foreign materials contained in it	10s.
„ 3.	—Determination of the species of any weed or other plant, or of any epiphyte or vegetable parasite, with a report on its habits, and the means of its extermination or prevention	5s.
„ 4.	—Report on any disease affecting the farm crop	5s.
„ 5.	—Determination of the species of a collection of natural grasses found in any district on one kind of soil, with a report on their habits and pasture value	10s.

II. ENTOMOLOGICAL.

„ 6.	—Determination of the species of any insect, worm, or other animal which, in any stage of its life, injuriously affects the farm crops, with a report on its habits and suggestions as to its extermination	5s.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES.

In sending seed or corn for examination the utmost care must be taken to secure a fair and honest sample. If anything supposed to be injurious or useless exists in the corn or seed, selected samples should also be sent.

In collecting specimens of plants, the whole plant should be taken up, and the earth shaken from the roots. If possible, the plant must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. Place them in a bottle, or pack them in tin-foil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

N.B.—*The above Scale of Charges is not applicable in the case of Seedsmen requiring the services of the Consulting Botanist.*

Parcels or letters (Carriage or Postage prepaid) to be addressed to Mr. W. CARRUTHERS, F.R.S., 4, Woodside Villas, Gipsy Hill, London, S.E.

H. M. JENKINS, *Secretary.*